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ABSTRACT

This manual covers cost accounting applications and techniques as they apply to institutions of higher education, focusing mainly on the different methods of allocating costs. The manual covers four major costing topics: aggregate institution and systemwide costs; major academic and administrative program costs; academic and administrative activity-based costs; and indirect cost recovery. After an introductory chapter, individual chapters cover: (1) the four-tier full-cost matrix and institution-wide macro-costing; (2) cost centers and macro-cost charts of accounts used in higher education; (3) institution full costs of primary by-function programs under various allocation rules; (4) aggregate costing of major professional academic programs; (5) macro-costing of departments; (6) academic micro-costing and determining the full cost of a course; (7) costing of support activities (total-cost management, activity-based costing, and process-cost management); and (8) other costing topics and issues. There are approximately 100 figures throughout the text; some chapters have worksheet exercises; and most have notes. Appendixes A and B cover the range of precision in costing standards, and a hierarchy of primary and support activities. Appendix C summarizes provisions of Circular A-21, Office of Management and Budget, "Cost Principles for Educational Institutions." (CH)

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Simplified Macro- and Micro-Costing Techniques

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Preface

On May 19, 1995, the National Association of College and University Business Officers (NACUBO) sponsored a seminar called "College and University Accounting and Reporting: Meeting the Needs of 2000 and Beyond." The underlying topic was how higher education financial reporting must change and might change in the future. Participants included many professionals responsible for promulgating or significantly influencing current and future accounting standards.

The general sense of the seminar was that the recent revolutionary changes in financial reporting standards exemplified by the Statement of Financial Accounting Standards (SFAS) No. 117[1] will enhance one's understanding of the college and university financial condition. The remaining differences in standards that continue to apply to public rather than independent institutions were duly noted.

While the seminar did not focus directly on costing, several useful insights on higher education costs were touched on. Most panelists saw a need for still better financial data, particularly cost data. The importance of information about higher education segments and sectors and about academic programs was mentioned. In addition, there were repeated exhortations for cost information that distinguishes clearly between core and noncore higher education activities.

The term "cost" is used constantly in higher education and has many different meanings. Cost information abounds, yet, as this book will show, it is seldom what it appears to be. College and university costing is undergoing rapid and extensive change. As institutions try to implement the SFAS No. 117 mandates, they find that their cost allocation practices must change also. While higher education administrators experiment with new approaches, they should remember that it is alright to be skeptical and to have a sense of humor. While most discussions involving financial issues are imbued with a high degree of solemnity, at times they often have their comical if not outright nonsensical overtones.

This is especially true with respect to many costing tasks where prevailing practice and standards remain highly subjective, or where the federal and state governments impose rules that are not always in the best interest of those required to abide by them. Sometimes individual institutions or entire segments of the industry will defend accounting practices that are either obsolete or dysfunctional because of an alleged unique need or because it would cost too much to change an existing cost accounting system.

This book starts from the premise that there is no great mystery about costs and costing, that the mechanics of cost allocation and cost-crossover accounting are by now well known, and, yes, that much costing activity is unglamorous, often tedious, and never finished.

Colleges and universities engage in many different kinds of costing, which are described herein, some in greater detail than others. The most important costing issues center on how effectively an institution allocates its resources. At any given time, across the nation, thousands of unheralded costing tasks are undertaken by managers within institutions without anyone else even being aware of their effects. These types of costing have been singled out and recognized since 1976 by NACUBO through its Cost Reduction Incentive Awards and Innovative Management Achievement Awards (recently renamed Higher Education Awards).

But higher education has been preoccupied with another type of costing: costing for indirect cost recovery, especially with respect to grants and sponsored research financed by the federal government under Office of Management and Budget Circular A-21 and its companion circulars that define the rules under which grant proposals must be submitted and certain indirect costs can be recovered.

Circular A-21's indirect cost allocation procedures for indirect cost recovery are now dominating much of higher education's interest in and practice of costing, especially where indirect cost recovery plays a central role in determining the financial health of the institution. NACUBO continues to conduct well-attended indirect cost recovery workshops that extol the benefits of cost pooling, a central Circular A-21 feature. Indirect cost recovery costing therefore consists of allocating these pooled costs to the academic and research programs for which federal support is sought.

Unfortunately, when institutions base their internal program costing on the after-the-fact allocation of usually rather large cost pools, they will more often than not sacrifice a great deal of costing precision to the relative simplicity of the costing task proper. Moreover, as institutions have learned to refine their cost allocation expertise and methodologies, they have increased the number of interesting and potentially appropriate cost allocation bases for individual costing situations. If they have paid attention, they will also have discovered that each allocation base produces its distinct cost outcome. Sometimes the differences are very large. Then the question arises: Which allocation bases should one choose?

Under SFAS No. 117, institutions are encouraged to allocate more of their pooled costs to primary programs than in the past. Although it may not be entirely clear at this writing what is meant by primary programs, the requirement for more direct costing is not a unique higher education invention. For-profit enterprises have been forced by competition and other reasons to allocate their pooled and indirect costs to their many product and service cost centers in order to know whether or not the prices charged cover the products' and services' full costs.

This book focuses on full costs throughout and does not distinguish between one type of full cost for public institutions and another for independent institutions. If two institutions, one public and the other independent, use the same resources, they will have identical costs under identical depreciation policies.

In spite of the influence of Circular A-21, many colleges and universities have broadened their direct-costing expertise and made it part of their annual budgeting process. Especially among smaller institutions, direct costing may in fact be more advanced than in some larger ones, especially if the latter do not subscribe to the practice of full-cost-center budgeting. One of the more peculiar legacies associated with (though not required by) Circular A-21 costing is the pooling of personnel benefits as an indirect cost when an eligible employee is hired. Perhaps it is easier for smaller institutions, rather than for complex ones, to charge personnel benefits directly to each department, although the crossover mechanics, once programmed, are rather elementary. Some institutions, public and independent, build their annual budgets from the bottom up on a full-cost basis, and this book looks at this type of costing also.

When the idea of this book was first discussed, for a brief moment the thought was to create a higher education costing textbook. Like similar works in the for-profit world of cost accounting for which the normal cost accounting textbook is written, this would have meant the production of a very detailed and thick volume. Instead, it was decided to be more selective and to leave out topics that would otherwise fall under the heading of cost accounting.

Specifically, this book focuses on costing illustrations that can assist institutions as they implement SFAS No. 117, and on certain costing innovations—activity-based costing and process costing—that have been of particular interest to the NACUBO membership. In this latter area, the objective is not so much to describe every cost accounting detail than to highlight the nature of what is at stake and to offer some of the arguments for and against the costing procedures involved.

With these thoughts in mind, this book is devoted to the following major topics:

1. After some introductory materials, it illustrates simplified costing techniques for institutions that continue to pool major costs before they assign or allocate them to key cost centers; this is called here from-the-top-down, after-the-fact macro-costing.
2. It outlines the principles of maximum direct departmental full costing, which implicitly leads to maximum-direct-program and by-function costs; this is called here from-the-bottom-up-at-the-cost-origin micro-costing.
3. After summarizing the scope of operational costing, the book describes activity- and process-based costing tasks designed to enhance cost-effective resource allocation. It also includes some concluding comments pointing to future developments.
4. Finally, the book contains appendices summarizing some of the basic principles of costing. Appendix C reviews indirect cost allocation under Circular A-21.

Notes

1. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for-Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993). See also SFAS No. 116.

Acknowledgments

Throughout my career, I have benefited from the wise counsel and example of others too numerous to list here. I want them to know that I am very grateful for their past help and, in so many instances, for their friendship. I am only too aware that I have absorbed less than they have tried to impart.

I dedicate this book to four individuals—all once associated with the College of Wooster—who have influenced my career in substantial ways: the late William J. Pocock, chairman of the Board of Trustees, who supported and encouraged my external professional work; George Ingram, past chairman of the Finance Committee, whose sometimes nontraditional ideas about financial reporting and costing are partially reflected here; the late Arthur H. Compton, who as chairman of the Board of Trustees suggested college financial management and planning to me as a career path; and G. Richard Wynn, vice president for finance and business at Haverford College, who was with me from the start and who today is in a position to tell me when I am off the mark! I think of all these people with deep gratitude.

My sincere appreciation is offered to those, too numerous to list, who have made substantive contributions to this manual by providing data, suggestions, and at times pointed and even humorous criticism. Of course, I take full responsibility for the contents and claim, as is custom, all errors and shortcomings as my own.

Very special thanks go to Caspa Harris for standing behind this project, to Robin Jenkins for her unflagging support and patience, and to Donna Klinger and Dale Adams for the efficiency with which they guided this book through publication.

—HHJ

Introduction

Background

This manual supplements and expands James A. Hyatt's *A Cost Accounting Handbook for Colleges and Universities*.[1] It expands the list of costing applications and modifies some of the underlying cost concepts and cost allocation procedures.

Prior to 1983, NACUBO and others had recognized the need for developing consistent cost information and costing techniques that could be applied throughout higher education. Several NACUBO committees made path-breaking contributions during the emergence of costing as a topic of vital importance to higher education. Of special interest, to this day, is the joint work on costing performed by NACUBO and the National Center for Higher Education Management Systems (NCHEMS) in 1977.[2]

The Carnegie Commission on Higher Education under the chairmanship of Clark Kerr also influenced higher education costing literature and practice. Its many publications helped advance the understanding of higher education economics and finance. Bibliographies of subsequent studies continue to testify to the commission's substantial contribution. Noteworthy examples are the references in *The Economics of American Universities*, which highlights a variety of important cost issues.[3] The authors suggest that the higher education "production function(s)" be studied more carefully, especially with respect to likely differential effects on costs of alternative combinations of resources in instruction and research. In another context, the volume recommends studies of the direct and indirect costs of sponsored research, of the cost of depreciation and obsolescence, and of induced usages of plant and equipment.[4]

The literature on costing is vast, and much of it addresses for-profit cost accounting. The writings on higher education costing are diverse and often respond to concerns of the moment. On balance, higher education, while having made much progress in costing, still lacks the tools needed for a full understanding of how it allocates its scarce resources. One of the chief reasons may well be that costing in higher education currently lacks sufficient uniformity and precision. It seems that costs are more or less in the eye of the beholder or that they depend on who does the costing.

On the Scope of this Manual

This manual deals extensively with cost allocation issues and peripherally with other prominent costing topics. Its main focus is on accounting costs from the institution's perspective and on the many different ways costs can be allocated to cost centers. Each allocation method tends to produce its distinct cost outcome. Therefore, before choosing a specific mix of cost allocation procedures, it is important to know what the resulting cost outcomes are. But first, institutions must define the uses to which specific cost information will be put. This manual stresses various degrees of precision in the costing of academic programs and administrative activities, whatever the level of cost aggregation.

From the institution's point of view, costs are an indicator of financial performance. Financial performance evaluation has many dimensions. The most important is not how, but how well resources have been allocated. At a time of increasing competition, growing resistance to price increases, and static or declining budgets, costing is the fundamental management tool that should precede the allocation of resources. First, one must know how much a given activity or program costs. Second, one should try to understand whether and how costs can be reduced without damage to the quality of the services involved.

This manual divides costing tasks into four distinct costing topics:

- Aggregate institution- and systemwide costs
- Major academic and administrative program costs
- Academic and administrative activity-based costs
- Indirect cost recovery

All but topic 1 depend upon the application of and choices among several cost allocation methods.

The Objectives and Intended Audience

This manual provides readers with a series of road maps for selected costing applications. It should be useful for all types of institutions, regardless of their differences with the two hypothetical institutions used as examples through the book. Many of the details may be most suitable for institutions whose costing practices are not yet fully developed in the areas covered here. For expert institutions, the manual offers suggestions about costing alternatives that may be more productive than some in current use.

This is both a how-to and an analytical book for professional managers engaged in costing. The book's focus on cost allocation alternatives raises questions of how appropriate specific costing methods are. What is suitable in one situation may not be in another.

It is assumed that the staffs responsible for cost accounting possess the technical skills for implementing cost crossover accounting and that they know cost accounting terminology. The decision was made early not to include mathematical models, since these are abundant in the generally available literature. Costing software is easy to find, and so is the expertise of technical consultants.

Others who may find this manual useful are governing boards, administrators, faculty, and others within institutions whose decisions directly affect the cost of higher education. Its potential audience also includes professors and students of higher education administration, as well as individuals and agencies outside of higher education proper who are interested in how and how well colleges and universities allocate private and public resources, and how their management decisions affect the cost of higher education.

It is not the principal aim of this manual to break new ground on the higher education costing frontier. Nevertheless, the reader may discover a few methodological innovations or clarifications worth looking into. One of them, the four-tier full-cost (FTFC) matrix, is used consistently throughout the manual. On other topics, an effort has been made to be as up-to-date as possible. Differences in accounting principles that may apply to public and independent institutions are not relevant here.

Finally, readers may concentrate on segments or chapters of the manual without needing to read every chapter, but chapter 1 is central to the entire manual.

Modern Cost Accounting Needs Versus Indirect Cost Recovery

Higher education cost accounting has been dominated by the costing procedures required under the Office of Management and Budget's (OMB's) Circular A-21 and its companion documents that stipulate specific accounting procedures that colleges and universities must adhere to when they submit their direct and indirect cost recovery requests.[5] (A May 8, 1996, revision to Circular A-21 was released too close to press time to be addressed in this book. Other revisions are expected later in 1996.) These mandated accounting rules were developed in joint efforts between the federal government and higher education, and they have a limited objective, however important it may be. Indirect cost recovery should be seen as a special case that must not overshadow the institution's overall costing needs.

The following quotation from an article in the "Portfolio" section of the NACUBO *Business Officer* supports this contention:

> Historically, costing of college and university programs has been confined to analysis required for the development and negotiation of indirect cost rates... That costing is limited primarily to function and employs the traditional step-down allocation process required by...Circular A-21. Although appropriate for the establishment of indirect cost rates, the step-down allocation process does not provide the [cost] information necessary to make decisions about possible modification or elimination of programs or services.[6]

The Prevalence of Cost Pools: Pooled Costs Equal Unallocated Costs

A prominent feature of Circular A-21 cost accounting is the prevalence—the very institutionalization—of large cost pools. When NACUBO and others organize seminars on indirect cost recovery accounting, cost pools are extolled as a virtue, if not a requirement for allocating indirect costs in a reasonably simple and economical fashion. In the process, indirect costs have come to mean any cost, direct or indirect, that have not been previously allocated to a cost center—a rather mushy definition.

In fact, many pooled costs are unallocated direct costs. A similar tendency favoring large cost pools was observed in for-profit cost accounting until recently, when competitive forces, improved accounting technologies, and other influences led to much more extensive and precise direct full costing.

Allocating Costs from Cost Pools Reduces Cost Precision

The allocation of pooled costs, whether through the step-down method or otherwise, almost always reduces precision in final costs. Enhanced precision in costing is of increasing interest to those seeking cost information everywhere. In higher education, the long-established practice of pooling vast cost entities stands today in sharp contrast with modern full-cost activity-, transaction-, and process-based costing, where the thrust is toward ever more precise direct and full-cost computation. Direct allocation and responsibility-center costing are finding growing favor among higher education costing practitioners.[7] Increasingly, the tendency is toward showing the true full costs of activities and programs, information that is crucial when institutions plan ahead, change budget allocations, or add and eliminate educational programs and administrative activities.

Therefore, an institution's cost accounting system that is solely or principally based on Circular A-21 costing practices is incapable of satisfying higher education's modern costing needs. This manual stresses direct program costing for maximum cost precision and illustrates the sometime enormous cost differences that result from implementing alternate cost allocation methods.

Costing Practices Differ Among Institutions

Institutions and the accounting profession have made considerable progress in fostering more nearly uniform approaches to costing. In spite of these worthwhile efforts, institutional costing preferences and know-how differ widely. This manual is not intended to point to a single correct approach. Sometimes preferred and, in several instances, mandated costing procedures are highlighted. In general, however, the emphasis is on costing alternatives, because institutional managers are normally the best judges when they seek the most appropriate cost allocation procedures.

Costing practitioners have at their disposal both simple and complex costing applications that now must be seen in the light of SFAS No. 117, in addition to Circular A-21. Unless a specific cost allocation method is mandated, the practitioner normally can choose among several costing alternatives. Sometimes the choices are so numerous as to be overwhelming. Many examples found in this book highlight the dilemma managers face when confronted with such situations.

Notes

1. James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983).

2. NACUBO and NCHEMS, *Procedures for Determining Historical Full Costs: The Costing Component of the Information Exchange Procedures*., 2nd ed., Technical Report 65 (Washington, D.C.: NACUBO and Boulder, Colo.: NCHEMS, 1977). NACUBO and NCHEMS, *Costing for Policy Analysis* (Washington, D.C.: NACUBO, 1980). For more on background, see NCHEMS, *Program Measures,* Technical Report 35 (Boulder, Colo.: 1973), NCHEMS, *Cost Analysis Manual,* Technical Report 45 (Boulder, Colo.: 1974), and Hyatt, *A Cost Accounting Handbook*, ix.
3. Stephen A. Hoenack and E.J. Collins, eds., *The Economics of American Universities: Management, Operations, and Fiscal Environment* (Albany, N.Y.: State University of New York Press, 1990).
4. Hoenack and Collins, *The Economics of American Universities,* 11, 149. Also, David S. Hopkins, "The Higher Education Production Function: Theoretical Foundation and Empirical Findings," in Hoenack and Collins, *The Economics of American Universities*, 31.
5. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21.
6. Cesidio G. Mancini and Ernest R. Goeres, "Direct Allocation Costing: Informed Management Decisions in a Changing Environment," in *Business Officer* 28 (10): 40 (April 1995).
7. Edward L. Whalen, *Responsibility Center Budgeting: An Approach to Decentralized Management for Institutions of Higher Education* (Bloomington, Ind.: Indiana University Press, 1991). See the afterword by John R. Curry on the experience at the University of Southern California with responsibility-center budgeting.

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The Four-Tier Full-Cost Matrix: Simplified Institutionwide Macro-Costing

This chapter answers the following questions:

- What is the meaning of full costs?
- What are the four principal stages in full costing?
- What is the format of the four-tier full-cost (FTFC) matrix?
- What is the effect on full costs of alternate depreciation or facilities-use charge policies?
- How does the FTFC model relate to SFAS No. 117?

Computing a single institutionwide cost figure is the simplest of all higher education costing tasks. It is the one costing task every institution cannot escape.

With only a few modifications, this task can be carried out directly from most audited year-end financial statements or from the institution's annual operating budget. No distinction between direct and indirect costs is required, because all costs are direct for the institution as a whole. This realization, sometimes overlooked in higher education, simplifies macro-costing for the entire institution enormously.

What Are Full Costs?

Full costs are the sum of all variable and fixed resources used or used up in producing a product or in rendering a service, including an appropriate allowance for physical asset depreciation and obsolescence, adjusted for any resale or salvage value. For the institution as a whole, the true meaning of full costs depends almost solely on how institutions account for costs associated with long-lived physical assets. On the basis of this definition, debt repayments are not a cost per se, although they will reduce cash flow.

The Institution as a Going Concern

In the aggregate, the issue is whether or not the institution is a going concern, an enterprise whose current sales and other current revenues cover the full cost of doing business in the long run. The distinction between short-run (variable) and long-run (variable plus fixed) costs is illustrated in figure 1.1. In this simplified example, the fixed costs are represented by the depreciation charge, a proxy for the cost of physical capital. By omitting, as in *A*, or including, as in *B*, a depreciation charge, reported institutionwide aggregate costs are either lower (*A*) or higher (*B*). Obviously, if this depreciation cost has been ignored in the past, say in a public institution's profit-and-loss report, suddenly recognizing it can be both dramatic, even traumatic. Institutions are going concerns only when their full costs (*B*) are covered by current revenues.

Figure 1.1: Reported Full Costs Before and After Depreciation ($ in 1,000s)

Cost Categories	Variable Costs (A)	Variable Plus Fixed Costs (B)
Personnel Compensation	$150,750	$150,750
Consumables	79,250	79,250
Total Variable	230,000	230,000
Depreciation	0	22,250
Full Costs	230,000	252,250
Depreciation as % of Full Costs	0%	8.82%

The Original Three-Tier Cost Structure

The original three-tier full-cost structure is described in figure 1.2.[1] Its principle feature is the distinction between direct, indirect, and capital costs, each cost tier representing the cumulative effect after each new cost type has been included.

Figure 1.2: Three-Tier Full-Cost Structure

Tier-One Costs (All Direct Costs ***Including*** Chargebacks)
+ All Indirect Costs = Tier-Two Costs
+ Depreciation or Equivalent = Tier Three Costs

This is a valid model for many costing applications, and today it dominates higher education macro-costing. Since this chapter is devoted to the institution as a whole, the distinction between direct and indirect costs is not relevant. More useful might be distinctions between variable and fixed, or short- and long-run costs; each of these cost types can be either direct or indirect.

As pointed out in the introduction, indirect-cost pools have become the basis for most macro-cost allocation requirements. However, many so-called indirect cost pools are nothing more than unallocated direct costs. To be precise, for the institution as a whole, aggregate indirect costs of tier two in the original three-tier cost model would comprise all unallocated pooled costs, direct and indirect.

Because modern costing requirements and pooling practices are undergoing significant changes, especially after the release of SFAS No. 117, a conceptual modification of the three-tier cost model to a slightly expanded four-tier full-cost model may be appropriate.

The Four-Tier Full-Cost Matrix

The conceptual modification to the three-tier model is consistent with SFAS No. 117 because it distinguishes between operating costs and those current costs represented by current and past asset acquisitions. For aggregate costing, nothing more is needed.

Figure 1.3 summarizes the FTFC model. Operating costs are classified by natural cost categories, and costs related to capital are divided into three distinct groupings:

- Net costs related to long-term plant debt
- Current physical assets with (or treated as if they had) a one-year useful life—referred to as one-year assets
- The current cost of long-lived physical assets represented by either a depreciation or a facilities-use charge

Figure 1.3: Four-Tier Full-Cost Matrix

Cost Stages		**Types of Costs**
Tier-One Costs		Personnel Compensation
	Plus	Consumables
	Plus/Minus	Adjustments to Eliminate Double Counting
	Equals	Total Tier-One Costs*
Tier-Two Costs	*Plus*	Costs Related to Long-Term Debt
	Plus	Ancillary Debt-Management Costs
	Minus	Sinking Fund and/or Debt Reserve Income
	Equals	Total Tier-Two Costs
Tier-Three Costs	*Plus*	Fully Expensed One-Year Assets
	Equals	Total Tier-Three Costs
Tier-Four Costs	*Plus*	Net Depreciation of Facilities-Use Charge
	Equals	Tier Four of Full Costs

* Net of scholarships, fellowships, and prizes.

Tier Definitions

Tier One

Tier one is composed of all natural noncapital operating costs normally found in the object-line-item budget. It has two principal components: total personnel compensation and total noncapital consumables. All fully expensed physical-asset acquisitions, including those for libraries and laboratories, facilities improvements, and mandatory and nonmandatory transfers have been eliminated. Interest on short-term debt is included. A line has been added for adjustments to eliminate any double counting. Finally, scholarships, fellowships, and prizes have been netted out of both income and costs. Thus, tier one costs are pure operating costs.

Tier Two

At tier two, only the total net cost associated with long-term debt is added. Normally long-term debt represents the financing of physical assets, but in recent years some institutions have acquired long-term debt for other than physical capital purposes. Long-term debt costs include interest and miscellaneous debt management costs adjusted for earnings from debt-sinking funds or reserves. Debt repayment, mandatory and nonmandatory, is excluded. While debt repayment is a negative cash flow, it is not part of the cost proper of capital. Any long-term debt cost related to accumulated operating deficits should be counted as a tier-one cost. For clarity, and especially if it is large, it can be identified in a separate line.

Tier Three

Tier three includes all fully expensed noncapitalized current-asset acquisition and improvement costs with useful lives of one year or less.

Tier Four

This tier includes the annual cost equivalent of all noncapitalized and capitalized depreciable long-lived assets with remaining useful lives of more than one year, minus any salvage or resale value. All past and current long-lived library- and laboratory-asset acquisitions are included here. Today, institutions use either a depreciation or a facilities-use charge.

One-year and long-lived physical-asset costs could easily be combined. The model identifies each for greater clarity. Institutions currently expense many physical asset acquisitions—most current library acquisitions come to mind—which have long useful lives. The FTFC model depreciates all such physical assets over their useful lives, whether or not the institution capitalizes them.

Like the three-tier model, the FTFC model can highlight the going-concern idea mentioned above. Each tier can be seen as a stage at which current revenues are covering (or not covering) a particular level of the institution's total current costs. Thus, by introducing the current revenue dimension into the FTFC matrix, the model incorporates a bottom-line indicator as shown in figure 1.4. In conformity with SFAS No. 117, cash flow can be substituted in a supplementary model. An institution meets the going-concern test if the remaining balance at stage four is either zero or positive. In the example, institution A meets the test; institution B does not. In this, as in most subsequent examples, scholarships, fellowships, and prizes have been netted out of both revenues and costs.

The four stages are as follows:

- Tier one represents the traditional operating result before any costs related to capital have been added; both institutions earn enough income to finance their current operating costs.
- At tier two, both institutions also cover the net cost of their long-term debt.
- At tier three, they also cover their respective costs of current one-year asset acquisitions.
- At tier four, institution A remains a going concern, whereas institution B shows a deficit.

Figure 1.4: FTFC Matrix for Two Institutions: Stages of Financial Condition ($ in 1,000s)

Tiers		Items	A	Balance Remaining	B	Balance Remaining
		Gross Income, Net SAGs		$37,250		$24,350
One		Operating, Net	$30,450	6,800	$21,750	2,600
	Plus	Debt-Related, Net	550		235	
Two	*Equals*		31,000	6,250	21,985	2,365
	Plus	One-Year Assets	1,050		285	
Three	*Equals*		32,050	5,200	22,270	2,080
	Plus	Depreciation	4,250		2,110	
Four	*Equals*		36,300	950	24,380	-30
		Cash Flow Required for Mandatory Debt Payment	675	275	385	-415

Note: "Balance Remaining" is not a "cash flow" balance.

Current Revenues or Cash Flow Available for Operations

Crucial to the meaning of the "bottom line" is what is and what is not included in the current revenue line against which these stages are measured. Here, SFAS No. 117, and its companion SFAS No. 116, add complications that have not been resolved at this writing. It could be said that, with respect to current revenues, SFAS No. 117 loses sight of the operating bottom line, and during field tests by a small sample of not-for-profit institutions, participants confessed to difficulties with the articulation of an operating measure.[2]

The Expanded Four-Tier Long-Run Cost Matrix

The most simple summary FTFC report has seven lines. It is suitable for all costing tasks requiring a single full-cost figure. Figure 1.5 shows an example.

At the other extreme, Figure 1.6 illustrates the most complex FTFC matrix. It incorporates the two types of distinctions: (1) direct and indirect costs, and (2) unrestricted, temporarily restricted, and permanently restricted costs. The second distinction conforms to the new SFAS No. 117 requirements for multicolumn presentations.

The expanded version of the matrix yields a cumbersome, though informative, report on long-run costs. It highlights the important fact that pooled costs can derive from unrestricted, temporarily restricted, and restricted funds, and that in each of these categories there will be both direct and indirect costs.

For practical reporting purposes, however, it may be appropriate to think of several distinct reports, each tailored to the needs of a specific audience. The distinction between direct and indirect costs would be made in cost reports where the effects of direct and indirect cost allocation procedures must be shown. The distinction between levels of restriction would be limited to the rare occasions when cost reports must contain a fiduciary dimension. In all other instances, the focus would be either on total or on unrestricted costs. The demand for the type of report shown in Figure 1.6 is probably quite limited.

Operating Revenues

FASB's *Special Report* did not say so, but the difficulty in articulating an operating result arises precisely because SFAS No. 117 is not primarily designed to highlight an operations-based financial result.* By incorporating the requirements of SFAS No. 116 for reporting contributions and handling net asset appreciation, SFAS No. 117 necessitates anyone interested in an operating result to reconfigure current revenues to exclude those that would not normally be part of the institution's operating budget.

Without an operating result or operating measure, higher education lacks a fundamental indicator of managerial financial performance—an indicator which many governing board members will want to see. For going-concern purposes, absent a SFAS No. 117 definition, institutions must define their own operating measure.

One of the test institutions in the *Special Report* solved the problem by distinguishing between operating and nonoperating revenues, arriving at a "changes in net assets from operating activities," followed by several lines of nonoperating income and expenses. The most interesting aspect of this institution's approach is that it lists operating expenses and losses first, followed by the operating revenues.

* Doris M. Balsch, Herbert K. Folpe, Susan E. Weiss, *Special Report: Results of the Field Test of the Proposed Standards for Financial Statements of Not-for-Profit Organizations and Accounting for Contributions*, Financial Accounting Standards Board, Financial Accounting Series No. 144-A (Norwalk, Conn., 1994).

Figure 1.5: Simple Four-Tier Full-Cost Report ($ in 1,000s)

Tiers		Cost Elements	
One		Personnel + Consumables	$571,219
	Plus	Debt-Related	5,360
Two	*Equals*		576,579
	Plus	One-Year Assets	3,885
Three	*Equals*		580,464
	Plus	Depreciation	24,250
Four	*Equals*		604,714

Refinements and Complications

The version of the FTFC matrix shown above may appear to be overly simple in the traditionally complicated world of higher education. Several issues might call for more elaborate or different presentations. The most obvious issues are—

Figure 1.6: Comprehensive or Expanded FTFC Matrix ($ in 1,000s)

Tiers		Cost Elements	Grand Total	Total Direct	Total Indirect	Unrest. Direct	Unrest. Indirect	Unrest. Total	Temp. Rest. Direct	Temp. Rest. Indirect	Temp. Rest. Total	Perm. Rest. Direct	Perm. Rest. Indirect	Perm. Rest. Total
One		Personnel Comp.	$33,259	$22,264	$10,995	$17,259	$5,115	$22,374	$1,260	$255	$1,515	$3,745	$1,880	$5,625
		Consumables, Net	14,301	11,598	2,703	9,823	578	10,401	225	120	345	1,550	455	2,005
		Total	47,560	33,862	13,698	27,082	5,693	32,775	1,485	375	1,860	5,295	2,335	7,630
	Plus	L.-T. Debt-Related	575	520	55	465	0	465	0	0	0	55	0	55
Two		Total	48,135	34,382	13,753	27,547	5,693	33,240	1,485	375	1,860	5,350	2,335	7,685
	Plus	Noncapitalized	1,760	1,110	650	785	250	1,035	50	0	50	275	125	400
Three		Total	49,895	35,492	14,403	28,332	5,943	34,275	1,535	375	1,910	5,625	2,460	8,805
	Plus	Depreciation	2,660	2,005	655	1,725	235	1,960	45	0	45	235	185	420
Four		Total	52,555	37,497	15,058	30,057	6,178	36,235	1,580	375	1,955	5,860	2,645	8,505

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- how to treat scholarships, fellowships, and prizes,
- why to distinguish between one-year and long-lived asset costs,
- the merit of an alternative order of the four stages, and
- the effect on full costs of different depreciation policies.

Alternative Presentations

Scholarships, Fellowships, and Prizes

In its most simple form, the FTFC model nets out all scholarships, fellowships, and prizes, and the entire component is treated as if it were a discount. Under SFAS No. 117, straightforward discounts will no longer be reported as an expense, but as a reduction in current revenues. At this writing an attempt is being made to reach a consensus on those elements of the component that eventually will remain classified as expenses and thus treated as true costs. While awaiting the outcome of the debate, the following are alternative forms of presentation within the FTFC model after all beginning revenue balances have been adjusted.

Alternative A

This option includes total scholarships, fellowships, and prizes as a separately itemized tier-one cost. Figure 1.7 illustrates the relevant portion of the matrix, designated as total student aid grants. It includes unrestricted as well as restricted funds. The gross revenue line has been adjusted accordingly.

Alternative B

Figure 1.8 reports tier one as a separate line item consisting only of unrestricted costs of student aid grants. Both figures 1.7 and 1.8 produce identical new tier-one remaining balances. Again, the gross revenue line has been adjusted.

Figure 1.7: New Tier One for Alternative A: Scholarships, Fellowships, and Prizes ($ in 1,000s)

Tiers		Items	A	Balance Remaining	B	Balance Remaining
		Gross Revenues		$47,960		$31,350
One		Operating, Net	$30,450	17,510	$21,750	9,600
	Minus	Total SAG Cost	10,710	6,800	7,000	2,600
New Tier One		New Operating Net	19,740	6,800	7,000	2,600

Alternative C

This approach is identical to the simplified model in figures 1.3 and 1.4 and nets out the entire component, reporting the amount of scholarships, fellowships, and prizes at the bottom of the matrix as a note for general information purposes.

Figure 1.8: New Tier One After Alternative B: Scholarships, Fellowships, and Prizes ($ in 1,000s)

Tiers		Items	A	Balance Remaining	B	Balance Remaining
		Gross Revenues, Net of Restricted Student Aid Grants		$44,800		$29,225
One		Operating, Net	$30,450	14,350	$21,750	7,475
	Minus	Unrestricted Student Aid Grants	7,550	6,800	4,875	2,600
New Tier One		New Operating Net	22,900	6,800	4,875	2,600

Alternative D

The bulk of scholarships, fellowships, and prizes is normally represented by need-based student aid grants. These are part of a student aid package that includes the cost of room and board or its equivalent for nonresident students. Traditionally, even the portion of price discounts related to room-and-board costs has been charged against tuition revenues rather than, as would be more logical, against auxiliary enterprise revenues. This distinction does not affect the overall bottom line of the going concern. But net operating revenues available for educational and auxiliary activities would be better defined if student discounts were directed to the cost centers to which they relate: the institution's academic and auxiliary enterprise operations.

The simplified approach is used below throughout; unless otherwise indicated, the entire student aid grant component is netted out. When appropriate, student aid grants are proportionately deducted from tuition and fees and from auxiliary enterprise revenues.

Fully Expensed, Currently Acquired Assets

For costing purposes, currently expensing an asset acquisition means to depreciate it fully in the current period. Under the methodology proposed and used here, asset acquisition costs are expressed only in terms of their annual depreciation equivalent.

Depreciation costs tend to be computed on the basis of an asset's estimated useful life. Most current fully expensed asset acquisitions have useful lives in excess of one year. When computing their costs, institutions may have to reclassify their currently acquired and fully expensed library and laboratory assets, reflecting their true useful lives. Most library acquisitions have long useful lives, certainly longer than one year.

Institutions are not asked to change their asset capitalization policies, but ideally all long-lived physical assets should be capitalized. The depreciable asset pool would then exclude all currently acquired one-year assets. This approach enhances costing consistency among institutions.

Another alternative is to generalize the Circular A-21 rule concerning short-lived assets.[3] Once the threshold for such assets has been raised from $500 to $5,000, fully expensed assets will certainly include even more long-lived assets. The one-year asset depreciation rule suggested here may be preferable, because it is both more logical and more precise.

As long as it is understood that the institution adheres to a useful-life costing policy, it may not be necessary to use a separate tier-three cost level. Instead, one-year assets can be listed separately under or aggregated with depreciation costs.

Alternative Order for the Four-Tier Cost Structure

Some institutions may prefer to record one-year asset costs as either tier-one or tier-two costs before debt-related costs. The current practice in expenditure reporting treats large annual investments in library and certain laboratory acquisitions as if they were consumables. There may therefore be a natural inclination to continue this practice when computing costs. Some institutions might prefer to show such costs explicitly before long-term debt costs, but only the depreciation equivalent should be shown lest costs (in contrast to expenses) be overstated.

The format used here (figures 1.3 and 1.4) has two purposes: First, the FTFC model acknowledges that such fully expensed acquisitions are assets, some with short useful lives and most with long ones. Second, it lists physical asset acquisitions and depreciation or facilities-use costs contiguously, after long-term debt costs. In this way, it indicates an order of priorities: A going concern is an institution that has sufficient revenues to first cover its operating costs, then its debt costs, and finally all costs related to its physical assets. Together, tiers two, three, and four represent the total current costs caused by the financing, using, and using up of physical capital.

Depreciation

When full costs as defined in this chapter are computed, all institutions, public and independent, must include an annual charge for the cost of long-lived physical assets. Institutions differ enormously in how they calculate their depreciation charges. Comparing depreciation costs among institutions often means comparing apples with oranges.

On balance, institutions appear to use Circular A-21 depreciation rules unless, in the view of their governing boards, the federal government's depreciation rates do not reflect the institution's perception of the useful lives of its assets. Figure 1.9 illustrates the effect of different depreciation rules on costs. The exhibit contains all the information needed to make the calculations.

Costing alternative E uses a replacement-value base for all physical assets, thus increasing the depreciation charge dramatically to 19.33 percent of total costs. Replacement values incorporate an adjustment for inflation in the value of physical assets.

Alternative D illustrates a shortened version of the types of distinctions many institutions make in computing their internal and Circular A-21 depreciation allowances among asset classes. Instead of only four classes of assets and useful life divisors, institutions are known to list a dozen or more.

Figure 1.9: Long-Term Depreciation Costs Under Alternative Depreciation Rules ($ in 1,000s)

Tiers		Items	A	B	C	D	E
Three			$93,250	$92,750	$93,250	$93,250	$93,250
	Plus	Depreciation	3,300	3,310	6,382	9,051	22,349
Four	*Equals*		96,550	96,060	99,632	102,301	115,599

Note: Value of under-depreciated physical assets: $165 million. For alternative B, $500,000 of long-lived noncapitalized acquisitions were added to the depreciable category. Total estimated replacement value equals $577,500,000. Depreciation policies follow:

A. 2 percent per year or 50 years
B. 2 percent per year plus 2 percent of $500,000 of fully expensed acquisitions
C. 2 percent for plant and 6.67 percent for equipment (as in Circular A-21)
D. Four classes of assets:
    7-year assets, 15 percent of total; $3,536,000
    15-year assets, 15 percent of total; $1,650,000
    25-year assets, 30 percent of total; $1,980,000
    35-year assets, 40 percent of total; $1,886,000
E. Average weighted rate of 3.87 percent of replacement value

The exercises at the end of this chapter let readers fill in their own cost data and make their own comparisons using these depreciation rules.

Facilities-Use Charges

Circular A-21 distinguishes between depreciation and facilities-use charges. Although it does not set a ceiling for the size of the depreciation charge, it imposes a cap on the size of any facilities-use charge. Specifically, it permits a maximum annual rate of 2 percent for facilities and 6.67 percent for equipment. Institutions using the simplified Circular A-21 method are limited by this rule also.

Institutions with a general facilities-use-charge policy are compelled by Circular A-21 to apply the above rates in their indirect-cost-recovery requests. Since these rates normally do not reflect the real-world useful lives of assets, a facilities-use-charge policy may therefore not be in the best financial interest of institutions. These prescribed rates help minimize the cost of depreciation to the federal government. While they also enhance cost comparability among institutions using this approach, in general they tend to understate depreciation costs. Institutions need to weigh the advantages and disadvantages associated with a facilities-use-charge policy, especially if the resulting asset-depreciation cost is less than it would be under a depreciation method. Institutions with facilities-use charges sometimes use replacement costs as an allocation base for internal cost reporting.

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Notes

1. James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983), 5.
2. Doris M. Balsch, Herbert K. Folpe, Susan E. Weiss, *Special Report: Results of the Field Test of the Proposed Standards for Financial Statements of Not-for-Profit Organizations and Accounting for Contributions*, Financial Accounting Standards Board, Financial Accounting Series No. 144-A (Norwalk, Conn., 1994), 9, 52, 62.
3. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21, section 16a(1).

Exercises

1. Fill out the attached four-tier cost matrix for your institution. In column A, use the approach suggested by your latest audited SFAS No. 117 or prior year-end financial statements. In column B, use the Circular A-21 approach for use allowances. In column C, use a depreciation rate that would be ideal for your institution if alternatives A and B understate the type of depreciation rate your best useful-life estimates would produce. It is possible that your A and C versions will be identical.

2. Using your current budget data, fill out worksheet 1.2 to determine your likely break-even point before transfers. Include the total endowment payout if your institution uses a total-return payout formula. Ignore any transfer representing a drawdown of reserves. The focus is on current income.

Worksheet 1.1:Comparative Full or Long-Run Costs at Your Institution ($ in 1,000s)

Tiers	Types of Costs	A	B	C
	Personnel Compensation			
	Total Consumables			
	Plus/Minus Bet Adjustments			
One	Total			
	L.-T. Debt-Related Costs			
Two	Total			
	Noncapitalized Assets			
Three	Total			
	Depreciation			
Four	Full Costs			
	Value of Depreciable Assets			
	Value of Noncapitalized Assets with More Than One-Year Life			

Worksheet 1.2: Object Line-Item Costs and Break-Even Point

Tiers	Cost Elements	Costs	Revenues	Difference
	Anticipated Total Revenues			
	Personnel Compensation			
	Salaries, Faculty			
	Salaries, Officers, Other Exempt			
	Salaries, Other			
	Wages, Clerical, Custod., Maint.			
	Wages, Students			
	Subtotal			
	Social Security			
	Medical Plan			
	Retirement Plan			
	Workers Compensation			
	Tuition Benefit			
	All Other			
	Subtotal			
	Total Compensation			
	Consumables			
	Supplies and Materials			
	Utilities			
	Insurance			
	Travel, Entertainment, Publicity			
	Printing, Publications, Copying			
	Books, Subscr. Period. for Adm. Use			
	Food (Food Service)			
	Inventory Valuation Adjustment			
	All Other			
	Subtotal			
	Plus/Minus Adjustments to Eliminate Duplication			
One	Total			
	Long-Term Debt-Related Costs			
Two	Total			
	Noncapitalized, Less Than One-Year Life			
Three	Total			
	Depreciation or Equivalent:			
	Equipment			
	Plant			
Four	Total Full Costs			

Note: Please substitute your object line items if they differ from the above.

—2—

Cost Centers and Macro-Cost Charts of Accounts Used in Higher Education

This chapter identifies the scope and diversity of frequently used macro-cost centers in higher education and provides examples of the most basic macro-cost charts of accounts.

What Is a Cost Center?

A cost center, or cost objective, is any entity, program, service, or activity whose cost is to be determined. Other terms used are profit center and cost-responsibility center. Here, these terms are used interchangeably.

Well-established cost centers are identified by means of charts of accounts. When new costing tasks arise, new cost accounts are created and may become part of the overall cost accounting system. Many costing tasks require the construction of ad hoc cost models that rely on, but are not always best served by, established charts of accounts.

Each institution has its formal and informal arrays of cost models. The formal ones are represented by the official chart of accounts normally used in budgeting and for costing tasks that rely on various combinations of the budget-based cost account structure. Informal cost accounts include all costing activities undertaken by individual managers for the benefit of their respective departments and managerial activities. They may not be part of the official cost accounting system, but may belong to a divisional or departmental subsystem used by a particular manager. The availability of personal computers facilitates departmental costing, and operational cost modeling at the departmental level is growing rapidly. In the final analysis, every individual cost account and cost model is a cost center.

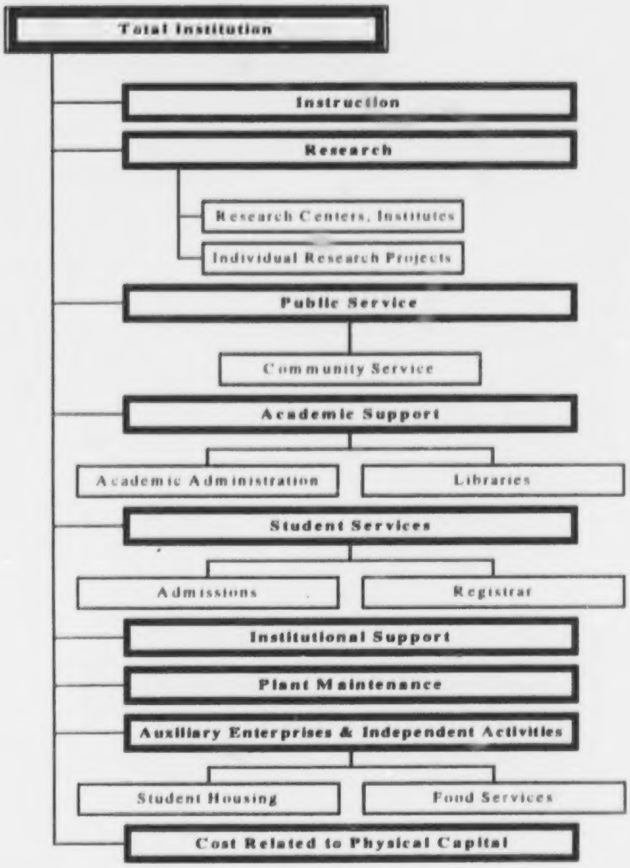
Basic Macro-Cost Charts of Accounts

Macro-costing, as understood here, refers to the practice of determining aggregate costs of easily identifiable, but relatively broad, institutional entities. These range from multicampus systems to individual academic and administrative departments. At larger universities, they include the traditional colleges and professional schools. The following types of charts of accounts serve as a basis for such costing.

Cost Accounts by Jurisdictions or by Major Administrative Functions

The by-administrative-function cost account is the traditional pre-SFAS No. 117 higher education chart of accounts and calls attention to jurisdictional cost centers.[1] Each account is represented by a budget for which an individual is responsible (figures 2.1 and 2.2).

Figure 2.1: Macro-Cost Account Structure with Aggregations by Selected Administrative Functions



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Sample Program Chart of Accounts

Instruction

- General academic administration
- Occupational and vocational instruction
- Special session instruction
- Community education
- Preparatory and adult basic education
  - Adult basic education
  - Compensatory education
  - English for foreign students
  - General educational development
  - Manpower-development training
  - Remedial instruction

Research

- Institutes and research centers
  - Individual research projects

Public Service

- Community service
- Conferences and institutes
- Cooperative extension services
- Public lectures
- Radio, TV, cable service*
- Regional medical programs
- Testing services

Academic Support

- Student services administration
  - Student admissions and records
  - Admissions office
  - Registrar's office
- Financial aid administration
- Counseling and career guidance
- Health and infirmary service
- Academic computing*

Institutional Support

- General administration
  - General administrative services
  - Governing board
  - Chief executive office
  - Chief academic office
  - Chief financial and business office*
    - Accounting
    - Planning and budgeting
  - Administrative computing
  - Purchasing
- Community relations
  - Development
    - Alumni relations
    - Public information
- Insurance administration*

Operations and Maintenance of Plant

- Physical plant administration
  - Custodial services
  - Landscape and grounds maintenance
  - Repairs and renovation*
  - Vehicle maintenance

Scholarships, Fellowships, and Prizes

For costing purposes, include only those items that do not represent either staff benefits or discounts (or equivalents) that reduce the student's invoice.

Mandatory Transfers

Interest and other costs directly related to long-term or physical plant debt. Included here are only those transfers that represent costs as defined below in contrast to reported expense.*

Auxiliary Enterprises

- Student housing*
- Faculty housing, minus staff benefit portion*
- Student food services*
  - Catering, special events*
- University stores
  - Textbooks management*
  - Other books management*
  - General merchandise management*
- Rental housing*

Hospitals

Appropriate accounts as needed.

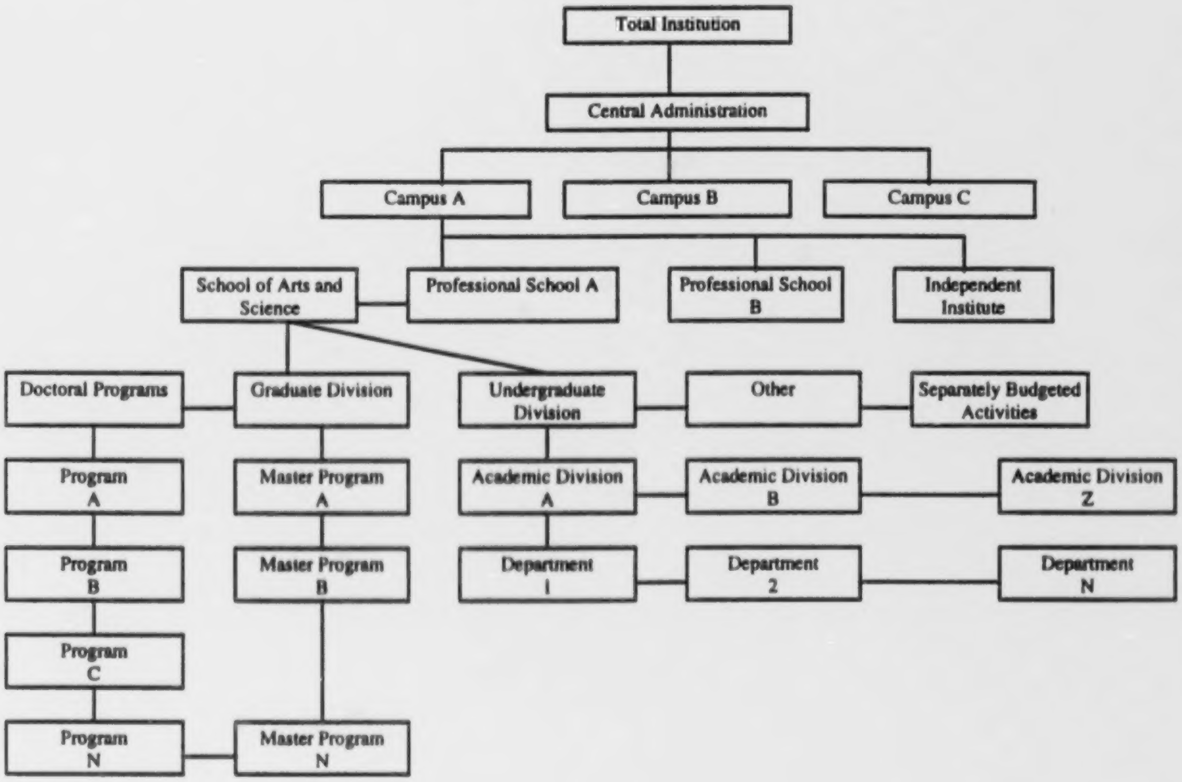
Independent Operations

Appropriate accounts as needed.

* Detail has been added.

Sources: James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983), 11. See also NACUBO and NCHEMS, *Procedures for Determining Historical Full Costs: The Costing Component of the Information Exchange Procedures.*, 2nd ed. (Washington, D.C.: NACUBO and Boulder, Colo.: NCHEMS, 1977), 2.5 and Hans H. Jenny, *Managerial Financial Reporting*, NACUBO, Financial Management Guidebook Series, no. 2 (Washington, D.C., 1993), 179.

Figure 2.2: Macro-Cost Account Structure Showing Selected Academic Jurisdiction Functions



Primary or Core Program Cost Accounts

Under SFAS No. 117, primary program accounts replace or at the very least modify the traditional by-administrative-function chart of accounts. SFAS No. 117 stipulates that institutions report their expenses by major programs and requires that many pooled and formerly separately reported support and indirect costs be allocated to these programs. Figures 2.3 and 2.4 illustrate two among several alternatives for charts of accounts.

Natural Costs

Every cost center and budget normally identifies so-called natural cost elements, also known as object-line-item costs. While the details may differ from institution to institution, figure 2.5 provides a generalized example.[2]

At present, institutions feel most comfortable with the by-administrative-function type of macro-cost accounts. Under SFAS No. 117, institutions are urged but not compelled to report on the basis of natural-cost elements. Some may find it disappointing that natural-cost reporting is not required, since natural costs are the principal basis for informing on the types and proportions of resources used.

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Figure 2.3: Primary Academic Programs and Professional Disciplines

Total Institution	Instruction Dept. Research	Sponsored Research	Public Service	Auxiliary Enterprises	Total Institution
Architecture					
Arts & Science					
Natural Sciences					
Business School					
Law School					
Social Studies					
Physical Education					
Medicine					
Engineering					
All Other					

Note: This chart assumes that support costs are fully allocated to the four primary programs for each academic cost center.

Figure 2.4: Primary Academic Programs and Support Activities

Total Institution	Instruction	Research	Public Service	Auxiliary Enterprises	Admin. & Inst. Support	O&M	All Other Support	Total Institution
Architecture								
Arts & Science								
Natural Sciences								
Business School								
Law School								
Social Studies								
Physical Education								
Medicine								
Engineering								
All Other								
Total								

Note: This chart keeps certain by-function support cost centers, but otherwise allocates support costs to primary programs.

Uniform Charts of Accounts

Various accounting authoritative bodies have created lists of charts of accounts that guide institutions toward a more or less common approach. The U.S. Department of Education in *The Blue Book* provides a recommended chart of accounts.[3] Examples were offered by NACUBO and the National Center for Higher Education Management Systems (NCHEMS), recommending subaccount categories based on definitions set forth in the Joint Accounting Group guidelines.[4] The earlier NACUBO and NCHEMS account structures are by now well entrenched. Below the level of aggregations in these exhibits, cost center details differ among institutions.

Sample Cost Classification Matrix

A consolidated macro-cost chart of accounts is normally presented as a matrix, with by-function or program costs shown horizontally and natural costs shown vertically. The example below combines administrative functions, cost-decision responsiblities, and selected natural costs.

Horizontal Display

Instruction

- Dean of law school
- Dean of business school
  - Associate dean of undergraduate program
  - Associate dean of graduate division
- Dean of arts and science division
  - Associate dean or director of humanities
    - Chair, department of English
      - Director of remedial writing and reading program
  - Associate dean of social sciences
    - Chair, department of economics
    - Chair, department of political science

Student services

- Dean of students
  - Director of student housing
  - Director of student life
  - Director of student financial aid
  - Dean of graduate admissions
  - Dean of undergraduate admissions
    - Director of enrollment management team
    - Director of admissions publications and public relations
    - Director of admissions database management
    - Director of new student financial aid

General institutional support

- President's office
  - Relations with governing board
- Vice president for academic affairs
  - Assistant provost's office
- Vice president for finance and business
  - Treasurer
    - Comptroller
    - Chief accounting officer
      - Data processing
      - Cost accounting
- General institutional
- Telecommunications
- Administrative computer services
- Legal, auditing, and insurance services

Operation and maintenance of plant

- Plant manager's office
  - Assistant manager, shops
  - Assistant manager, purchasing and inventory
    - Shop supervisors

Auxiliary enterprises

- Student housing
  - Assistant for student amenities
  - Assistant for custodial services in housing
- Director of food service
  - Assistant director of food service, dining halls
  - Assistant director of food service, catering
- Manager of university stores
  - Assistant manager, textbooks
  - Assistant manager, general merchandise

Vertical Display

Personnel compensation and professional services

Salaries

- Faculty, full-time
- Faculty, part-time
- Officers
- Other exempt staff

Wages

- Clerical
- Crafts and maintenance
- Custodial
- Security
- Students, work study
- Students, other

Professional services

- Academic
- Administrative
- Auxiliaries and other

Staff benefits

- Retirement plan
- Health plan
- Social security
- Workers' compensation
- Unemployment
- Disability
- Tuition benefit, on campus
- Tuition benefit, off campus
- Food, lodging, and transportation
- Other

Consumables
- **Supplies**
  - Office
  - Maintenance supplies and materials
  - Custodial
  - Medical
  - Photographic
  - Printing, duplicating
- **Travel and entertainment**
  - **Transportation**
    - Airline tickets
    - Bus, rail
    - Car rentals, external
    - Car rentals, from pool
    - Mileage allowances
  - **Living costs**
    - Overnight
    - Meals, beverages
  - **University guests**
    - Transportation
    - Room and meals
- **Utilities**
  - Electricity, produced in-house
  - Electricity, purchased
  - Coal, fuel oil for heating and cooling
  - Natural gas
  - Other heating and cooling
- **Insurance**
  - Property and general liability
  - Key executive life insurance
  - Special hazards insurance
  - Student health and accident insurance
  - Employee accident insurance
  - Employee professional liability insurance
  - Special events insurance
- **Printing and publishing**
- **Merchandise for resale, inventory change**
  - Textbooks
  - Other books
  - General merchandise
  - Food
- **Other inventory valuation adjustments**
  - Maintenance supplies and materials
  - Building supplies, materials
  - Coal, fuel oil, other
- **Contract services other than professional**
  - Custodial
  - Facilities maintenance
  - Equipment maintenance

Wear-and-tear and replacement costs related to capital items or to changes in valuations of physical assets

Increasingly represented by depreciation or facility-use charges. Includes all long-lived assets (more than one year).

- **New equipment**
- **Equipment replacement**
- **Library and other educational acquisitions**
  - Books
  - Periodicals, serials
  - Software
  - Visual aids
- **Laboratories, classrooms**
  - Equipment
  - Installations
  - Improvements
- **Financing costs**
  - Short-term interest
  - Long-term interest
  - Other debt service costs

The costing procedures discussed later in this manual require no changes in an institution's by-administrative-function or major-program chart of accounts other than those that may come about as a result of implementing SFAS No. 117 financial reports.

Figure 2.5: Natural-Cost Account Structure with Selected Object-Line Items

Account Structure	Object-Line Items
Personnel Compensation	Faculty salaries
	All other salaries
	Support staff wages
	Student wages
	Staff benefits
	Professional services
Consumables	Supplies
	Travel, entertainment
	Transportation
	Telecommunications
	Contractual services, rentals
	Utilities
	Advertising
	Printing, publications
	Insurance
	Postage, freight, other
	All other
Capital-Related	Interest
	Current cost of short-lived (one-year) assets
	Current cost of depreciable long-lived assets • Equipment, furnishings • Plant improvements • All other physical facilities and equipment

By-Function Accounts and Natural Costs

However, by-function and by-program types of accounts must be excluded from the natural-cost structure. Institutional budgets frequently include, among the natural cost items, some costs that really belong on the by-function list. Even when shown in a lump sum, any account whose costs represent a combination of personnel, consumables, and capital costs must not be included in a natural-cost classification. Examples are natural or object-line costs such as commencement, alumni weekend, and even summer school; all are combinations of personnel compensation, consumables, and sometimes capital costs.

In other instances, natural costs appear on by-function lists. For instance, Hyatt and NCHEMS list utilities in the by-function classification.[5] Figure 2.5 classifies utilities as a natural cost. Of course, there could be a functional account called "utilities administration" where the charge for utilities proper is a natural cost, supplemented by other costs for personnel compensation and whatever other resources it takes to manage the utility department. It is therefore important that institutions distinguish clearly between by-function and natural costs. Charts of accounts devoted to costing as defined here should be reviewed in order to correct any inconsistencies.

Other Dimensions for Macro-Cost Account Classification

The preceding charts of accounts form the basis for most macro-costing tasks, but they have one serious limitation: They do not zero in on most of the program-, activity-, and process-cost questions that managers and others must answer each day. Therefore, these most-used accounts constitute an inadequate basis for answering many of the truly interesting costing questions that arise almost daily in higher education. The following additional selected classification criteria supplement the traditional macro-cost accounts.

Primary Versus Support Programs

The important distinction between primary and support program costs is highlighted in SFAS No. 117. The primary missions of colleges and universities are said to be—

- instruction,
- research,
- public service, and
- auxiliary enterprises, including hospitals and other independent operations.

Everything else is support. Instruction and research are normally viewed as the primary academic missions. For some institutions, hospitals and independent operations have academic dimensions. For the large majority of independent colleges, public service is minuscule and thus not a distinct mission.

Primary Academic Programs and Instruction

Instruction at most universities is carried out at several professional schools and colleges, such as those of architecture, the natural and the social sciences, law, medicine, engineering, the fine arts, and physical education. These are illustrated in figures 2.3 and 2.4. Instruction, research, and public service can be subsets of the primary programs represented by schools of business, law, architecture, and the fine arts. At principally undergraduate institutions, divisional or departmental disciplines are normally substituted for these professional classifications.

Instructional costs, in the narrow sense, are often classified according to a variety of other programmatic dimensions:

- The entire undergraduate component
- Lower level (freshman and sophomore years) and upper class (junior and senior years) undergraduate program

- The cost of common course requirements, such as a generally required freshman or senior courses
- The cost of a major
- The cost of an honors or senior independent study program
- The cost of the junior-year-abroad program
- The cost of tutorial and remedial instruction
- Total graduate program costs
- The cost of specific graduate degrees at the master's and doctoral levels

These and many similar elements of the instructional program give rise to their specialized cost studies and require specialized charts of accounts when they are not already represented by a budget account.

Core Versus Noncore Programs

The core versus noncore comparison is similar to the primary versus support program distinction, but also has special academic connotations. How do institutions define their so-called core programs? Is the core what is required to obtain a degree, a major, a required academic concentration? Professional schools and academic departments have study requirements that are central to their particular disciplines and offer courses and methods of study that fulfill them. In addition, students may be required to take or can voluntarily choose courses and study topics which are not directly related to their professional field of concentration. As institutions define their core programs—if they can—they can also try to determine their costs and distinguish them from the costs of noncore programs. The traditional by-function chart of accounts does not normally accommodate cost questions that arise from the core/noncore program distinction.

Interdepartmental Administrative and Operational Costs

In recent years, college management has begun to identify certain costing issues that are not addressed directly in existing charts of accounts, partly because they cut across many jurisdictions and partly because institutions have novel ways of looking at costs. Among these, the following have become prominent:

Marketing costs

- Student recruitment or enrollment management costs
- Fund-raising (annual funds, capital campaigns) costs
- Institutional advertising and public relations costs

Employee benefit costs

- Health plan costs
- Retirement benefits costs
- Government-mandated employee benefits

Risk management costs

- Asset (insurance, prevention, security) protection
- Employee liability (insurance, training, prevention) costs
- Personal security (personnel, students, visitors) costs

Compliance costs

- EEOC hiring and employment compliance costs
- ADA, OSHA, and other compliance costs

Transportation costs

- The cost of maintaining the vehicle pool
- The cost of transportation on and off campus of employees, students, supplies, materials, etc.
- The cost of travel

Costs related to federal and state programs

- The cost of grants management (federal, state)
- Reporting requirements costs
- Required matching-funds program costs

This list could be expanded easily. In not a single instance can these types of costs be ascertained simply by looking up the pertinent cost account or budget. By themselves, they are not higher education program costs, they seldom fall neatly into a specific by-function slot, they always cut across two or more jurisdictions, and they all are support costs.

Activity-Based Costs

Finally, most operational costing tasks tend to zero in on discrete institutional and departmental activities. Few of these are addressed by established charts of accounts. Chapter 7 will discuss activity-based and process costing.

Notes

1. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993).
2. Hans H. Jenny, *Managerial Financial Reporting*, NACUBO, Financial Management Guidebook Series, no. 2 (Washington, D.C., 1993), 179.
3. U.S. Department of Education, *The Blue Book* (Washington, D.C., July 1995).
4. James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983), 11. Douglas J. Collier and Richard H. Allen, *Data Providers' Guide*, vol. 1 of *Higher Education Finance Manual* (Denver, Colo.: NCHEMS, 1980), 68.
5. Hyatt, *A Cost Accounting Handbook*, 13. Collier and Allen, *Data Providers' Guide*, 69.

— 3 —

Institutionwide Full Costs of Primary By-Function Programs Under Varying Allocation Rules

This chapter introduces the case of Research University, a hyphothetical independent research university. A sequence of exhibits highlights how "primary" program costs change as more support costs are allocated to them.

Research University's Board Requests Cost Information

On June 30, 1995, Research University's governing board requested from the institution's president a draft proposal on how the university might henceforth report certain specific types of macro-costs in a supplement to the normal audited financial report. The gist of the board's cost request is as follows:

1. An aggregate or macro-cost figure for the institution as a whole using the cost definition of chapter 1
2. Macro-cost figures for the principal administrative functions traditionally identified by the university's audited year-end financial report, both before and after the allocation of support costs
3. Macro-cost figures for the university's principal professional schools and colleges
4. Departmental costs within the natural and mathematical sciences program

All cost figures must include the cost of physical capital as a depreciation charge. The board asked specifically for realistic estimates of depreciation costs based on historical asset valuations and useful-life estimates. The board stipulated that all cost models must make a clear distinction between operating costs and costs associated with the financing and use of physical assets. The board also indicated that, once agreement had been reached on how to implement such costing in the future, funds would be appropriated to create any necessary historical databases for these four types of costs.

Institutionwide Full Costs

Of the four basic costing assignments given by the board, the first two concerned the questions of how macro-costs for the institution as a whole and by-function costs should henceforth be reported. In view of the fact that financial reporting practices are changing under SFAS No. 117, the university is offering a choice of by-function cost reporting models.[1]

The Four-Tier Full-Cost Model

The four-tier full-cost (FTFC) model described in chapter 1 distinguishes between operating costs and the three types of costs that stem from the university's physical capital investments. This model will serve as a basis for all macro-costing illustrations found in this chapter. Figure 3.1 summarizes Research University's full costs. Subsequent exhibits show how different allocation procedures distribute specific types of costs among the major administrative functions. Each exhibit clearly identifies each cost tier and the respective allocation bases and parameters. What is important is how and why the cumulative by-function costs change for each cost model and after each cost allocation procedure.

Figure 3.1: Research University's Four-Tier Full Costs in the Aggregate ($ in 1,000s)

Tiers	Items	Costs by Tiers	Going Concern Balances
	Current Revenues*		$308,723
One	Personnel	$175,444	
	Consumables	102,383	
	Total	277,827	30,896
Two	Debt Costs	4,238	
	Total	282,065	26,658
Three	One-Year Assets	2,446	
	Total	284,511	24,212
Four	Depreciation	19,256	
	Total	303,767	4,956

* For current revenues definition, please see chapter 1.

Five Cost Models

Figure 3.2 compares tier-four or full costs for each of the five costing alternatives presented below and makes clear that a program's full cost is definitely determined by how and to what degree various cost pools are being dispersed among a given list of cost centers.

Figure 3.2: Comparison of Tier-Four or Full Costs for Major Administrative Functions at Research University Using Different Cost Allocation Procedures ($ in 1,000s)

Programs	By Function (Figs. 3.3 & 3.4)	Debt & Depreciation Costs Allocated (Fig. 3.5)	Other Pooled Direct Costs Allocated (Fig. 3.6)	All Support to Primary Program (Fig. 3.7)
Primary				
Instruction	$78,249	$87,931	$142,267	$164,673
Research	32,781	34,534	48,340	51,750
Public Support	6,384	6,427	8,003	8,682
Auxiliary Enterprises	59,106	59,106	72,366	78,663
Total Primary	176,520	187,998	270,976	303,768
Support				
Academic	21,356	21,737	696	0
Executive Administration	15,673	15,885	4,761	0
Public Relations	11,281	11,293	3,275	0
Student Services	20,515	20,673	8,452	0
General Institutional	14,244	14,366	5,923	0
O&M	37,348	24,975	9,670	0
Other	6,830	6,840	15	0
Total Support	127,247	115,769	32,792	0
Total	303,767	303,767	303,767	303,767

Note: Because of rounding, figures may not add up exactly to totals.

This table shows the obvious: Primary program costs increase as more and more support costs are allocated to primary cost centers. The support cost component declines gradually and disappears when all of its costs have been allocated to the primary programs. Costs among institutions for like by-function programs often differ depending on how many pooled direct and indirect support costs have been allocated to primary programs.

Each vertical full cost array represents a specific costing model, and each is in its own right a correct representation of the university's costs. Throughout, the university's aggregate full cost is $303,767,000. The principal difference is how and to what degree support costs have been allocated in each model.

First, the only changes in the pre-SFAS No. 117 audit data concern the elimination of certain noncost expenditures (i.e., debt reduction) and the identification of one-year asset acquisitions. Second, costs related to long-term debt and depreciation are charged directly to the respective plant accounts of operations and maintenance (O&M) and auxiliary enterprises. Third, equipment acquisitions and the associated depreciation costs are charged directly to the acquiring academic or administrative departments. In general, the university has moved gradually toward less pooling in order to maximize direct costing within the traditional by-function chart of accounts, in part anticipating the direct-costing opportunities inherent in SFAS No. 117.

Which of the five models summarized in figure 3.2 represents best the costing assignment given to the university? Which model reflects best the post-SFAS No. 117 reporting requirement? What other allocation alternatives should be explored? Which model or models will the board choose as future cost-reporting vehicles for the university? To help answer these questions, a look at each model is appropriate.

Model One: Standard By-Function List of Program Costs

Figure 3.3 describes the FTFC structure for the university's major by-function programs that have been identified in the year-end audited financial report to date.

Figure 3.3: Model One—Four-Tier Full Costs by Major Administrative Functions at Research University ($ in 1,000s)

Programs by Function	Tier One	Long-Term Debt Cost	Tier Two	One-Year Assets	Tier Three	Deprec. Cost	Tier Four (Audit)
Instruction	$77,425		$77,425	$824	$78,249		$78,249
Research	32,520		32,520	261	32,781		32,781
Public Service	6,330		6,330	54	6,384		6,384
Academic Support	21,041		21,041	315	21,356		21,356
Executive Administration	15,615		15,615	58	15,673		15,673
Public Relations	11,255		11,255	26	11,281		11,281
Student Services	20,447		20,447	68	20,515		20,515
General Institutional	14,086		14,086	158	14,244		14,244
O&M	22,025	$3,098	25,123	392	25,515	$11,833	37,348
Education & General	220,744	3,098	223,842	2,156	225,998	11,833	237,831
Auxiliary Enterprises	50,258	1,140	51,398	285	51,683	7,423	59,106
Other	6,825		6,825	5	6,830		6,830
Total	277,827	4,238	282,065	2,446	284,511	19,256	303,767

Notes: The University allocates one-year assets directly to each acquiring department. Long-term debt costs and depreciation are charged to facilities in operations and maintenance (O&M) and auxiliary enterprises respectively.

Model Two: Standard By-Function Costs Distinguishing Primary from Support Activities

Figure 3.4 is identical to figure 3.3 in every respect, except that the primary program accounts are listed separately from the support accounts. None of the four cost tiers change. This format could be an appropriate post-SFAS No. 117 cost-reporting option, provided the university has implemented all outstanding direct-cost allocation and accounting changes.

Model Three: Allocating Long-Term Debt and Depreciation Costs to Facilities in Primary and Support Activities

Figure 3.5 illustrates the effect on tier-two through tier-four costs when long-term debt and depreciation costs are distributed from O&M to the primary and support areas where the original debt cost originated. Since the university charges these costs directly to each plant account with debt and does not pool them, they transfer relatively easily to each affected function. In most instances, no special allocation procedure is needed. In the few instances where plant with debt is shared by two or more primary and support functions, debt costs are allocated on the basis of assigned square footage.

After the allocation, $1,125,000 of long-term debt cost remains in the O&M account. $3,090,000 was transferred to primary programs, and $23,000 was shifted to academic support. Tier-two primary costs increase by $1,407,000 for instruction, by $528,000 for research, and by $15,000 for public service. Debt cost for auxiliary enterprises does not change.

Research University's Accounting Practices

Since the pre-SFAS No. 117 starting point for cost allocation differs among institutions, some information on how Research University has previously allocated costs is essential. The following is a capsule summary of its principal pre-SFAS No. 117 accounting policies:

- An extensive system of internal pricing and chargebacks exists for direct-cost transfers, first among support departments, and second from support to primary programs. All purchases from external vendors are charged directly to the appropriate natural-cost category of the acquiring department. Internally rendered services are sold to departments on a cost-of-labor-and-materials basis, with a variety of markups for handling, incidentals, and overhead. Utility costs are charged directly to each facility on either a metered basis (for facilities with meters) or prorated on a total-square-footage basis (for facilities without meters). For some costing tasks, electricity costs are appropriately allocated on the basis of student or staff usage.
- Personnel benefits—a direct cost—were pooled by functions in the past, but are now charged directly to each department—Shared staff costs are apportioned among the affected departments. Even benefits that do not run through the payroll system, such as the tuition benefit, staff travel benefit, and research stipends, are no longer pooled and charged directly to the departments.
- The net cost of long-term plant debt is charged directly to plant with debt.
- The university has adopted a useful-life-based depreciation policy. Plant and equipment depreciation is charged directly to each facility and computed on the basis of the undepreciated historical value of each facility. Equipment depreciation is charged directly to each acquiring department. Pooled or shared depreciation costs are allocated on the basis of assigned or total square footage, whichever is more logical.
- Scholarships, fellowships, and prizes were reported as an educational and general expense in the past; they are now treated as a discount. Prizes and certain awards for merit are treated as a tier-one cost.
- The costs contained in the university's by-function support accounts reported in the year-end audit represent the remaining cost pools whose allocation is the subject of this chapter.
- For internal financial reporting and costing, the university will henceforth deduct student aid grants from tuition and fees, room and board, and other relevant auxillary enterprise revenues in proportion to their respective weights as they are reflected in the student's financial aid budget and package.

Selected Principles Governing Cost Allocation

The Affinity Requirement

The leading literature on costing, whether it applies to for- or not-for-profit organizations, stipulates that cost allocation bases must have a high degree of affinity with the cost element that is to be allocated. This means that there must be some logical or cause-and-effect connection. While most higher education cost allocation practices involve allocation bases that have such affinity, some do not. Some allocation procedures are imposed upon institutions by Circular A-21 and similar federal government pronouncements. Sometimes these external rules actually prescribe specific cost accounting details that violate the affinity principle. Sometimes institutions choose allocation bases for their simplicity rather than their logical affinity.

The Desired Degree of Precision in Costing

Costs should be as precise as is possible under each institution's particular circumstances. The costing literature addresses this issue by stipulating that costing should be carried out within a framework of economic feasibility. What may not be economically feasible in 1950, may be so in the year 2000. As accounting technology and computer capabilities advance, more precision can be brought to costing. This is one reason why direct costing is on the increase and will continue to expand. Cost pooling was introduced for reasons of economy and simplicity. It also reflected, compared to today, a relatively primitive and cumbersome state of accounting technology. Modern computer-based cost accounting technology, on the other hand, is versatile, flexible, and facilitates multiple complex cost transfers. Simplicity in costing and percentage allocation of costs reduces costing precision. Several examples in this and subsequent chapters demonstrate that precision in costing can be enhanced even within the framework of large cost pools.

Figure 3.4: Model Two—Four-Tier Full Costs at Research University, with Primary and Support Programs Reclassified ($ in 1,000s)

Programs by Function	Tier One	Long-Term Debt Cost	Tier Two	One-Year Assets	Tier Three	Deprec. Cost	Tier Four (Audit)
Instruction	$77.425		$77.425	$824	$78.249		$78,249
Research	32.520		32.520	261	32.781		32.781
Public Service	6.330		6.330	54	6.384		6.384
Auxiliary Enterprises	50,258	$1.140	51.398	285	51,683	$7.423	59.106
Total Primary	166.533	1.140	167.673	1.424	169.097	7.423	176,520
Academic Support	21.041		21.041	315	21.356		21.356
Executive Administration	15,615		15.615	58	15.673		15,673
Public Relations	11.255		11.255	26	11.281		11.281
Student Services	20.447		20.447	68	20.515		20.515
General Institutional	14.086		14.086	158	14.244		14.244
O&M	22.025	3.098	25.123	392	25.515	11.833	37.348
Other	6.825		6.825	5	6.830		6.830
Total Support	111.294	3.098	114.392	1,022	115.414	11.833	127.247
Total	277.827	4.238	282.065	2.446	284.511	19.256	303.767

Depreciation costs appear in the university's individual plant accounts, and because of detailed equipment inventories, the university is able to assign equipment depreciation to individual departments. The cost of depreciation in figure 3.5 is thus allocated precisely to each primary and support activity. As a result, $10,400,000 of depreciation costs moves from the O&M account to other primary and support accounts.

Model Four: Allocating Selected Support Costs to Primary Activities

Some separately pooled support costs are actually direct costs when seen from the perspective of specific primary programs. Three obvious examples are academic support, student admissions, and the registrar's and student records offices. Even some or all costs of student life could be assigned directly to instruction, but they are not allocated there in this model. Figure 3.6 illustrates the effect of such cost transfers on tier-one and full costs. For instance, academic support ($21,041,000) is allocated to instruction (70.42 percent) and research (29.58 percent), and the admissions and registrar's cost ($20,447,000) is extracted from student services and allocated fully to instruction. Without its primary instructional mission, the university would have no academic support, admission, or registrar functions.

Other direct support costs were allocated on the basis of the original tier-one cost structure, and the allocation bases used are total tier-one costs, personnel compensation costs, and

Frequently Used Allocation Bases in By-Function Costing

The following list identifies the allocation bases used most frequently in higher education by-function pooled-cost allocation procedures:

- **Academic administration**
  - Personnel compensation
  - Arbitrary prorating rule
  - Time or service study
  - Student credit hours
  - Direct costs
- **Libraries**
  - Personnel compensation
  - Total hours open or used
  - Student credit hours
  - Circulation and checkout
  - FTE faculty- and FTE student-use factor
  - Direct costs
- **Student services**
  - Student credit hours
  - Student applications and matriculations factor
  - Number of degrees awarded
  - Number of courses offered
  - Personnel compensation
  - Number of applications processed
  - Number of student registrations processed
  - Number of student aid applications processed
  - Number of matriculating students with student aid
- **Academic computing**
  - Number of work stations in use
  - Hours of usage
  - Number of projects processed
  - FTE student- and FTE faculty-use factor
  - FTE student usage; time study
  - Direct costs
- **Executive management**
  - Personnel compensation
  - Arbitrary prorating rules
  - Time study
  - Student credit hours
  - Direct costs
- **Plant operations**
  - Square feet occupied or assigned
  - Value of plant
  - Direct costs
  - Technical and other usage measures
  - Personnel compensation
- **Staff benefits**
  - Salaries and wages
  - Number of personnel
- **Long-term debt costs**
  - Value of assets financed
  - Square footage
- **Depreciation**
  - Square feet of facilities
  - Value of facilities

square footage. The respective allocation percentages can be found in columns K,. L, and M of the exhibit. Each dollar amount and the account to which it is transferred are shown. The allocation bases are noted on the right for each category of costs.

Figure 3.5: Model Three—Four-Tier Full Costs at Research University, with Long-Term Debt and Depreciation Costs Allocated to Cost Centers as Direct Costs ($ in 1,000s)

Programs by Function	Tier One	Long-Term Debt Cost	Tier Two	One-Year Assets	Tier Three	Deprec. Cost	Tier Four (New Audit)
Instruction	$77,425	$1,407	$78,832	$824	$79,656	$8,275	$87,931
Research	32,520	528	33,048	261	33,309	1,225	34,534
Public Service	6,330	15	6,345	54	6,399	28	6,427
Auxiliary Enterprises	50,258	1,140	51,398	285	51,683	7,423	59,106
Total Primary	166,533	3,090	169,623	1,424	171,047	16,951	187,998
Academic Support	21,041	23	21,064	315	21,379	358	21,737
Executive Administration	15,615	0	15,615	58	15,673	212	15,885
Public Relations	11,255	0	11,255	26	11,281	12	11,293
Student Services	20,447	0	20,447	68	20,515	158	20,673
General Institutional	14,086	0	14,086	158	14,244	122	14,366
O&M	22,025	1,125	23,150	392	23,542	1,433	24,975
Other	6,825	0	6,825	5	6,830	10	6,840
Total Support	111,294	1,148	112,442	1,022	113,464	2,305	115,769
Total	277,827	4,238	282,065	2,446	284,511	19,256	303,767

Model Five: Allocating All Tier-One Support Costs to Primary Programs

The preceding model still leaves some indirect support costs unallocated. Figure 3.7 illustrates the effects on tier-one and full costs when these remaining tier-one support costs are allocated to primary programs. The tier-one cost base (column B) reflects the figure 3.6 adjustments. The allocation procedures are similar to those used in figure 3.6, except that new figure 3.6 primary program percentage allocation bases (columns K, L, and M) are used. Simultaneously, this model also allocates the remaining tier-two through tier-four costs.

Total support costs could also have been allocated to the four primary programs without using the figure 3.6 intermediary step. But this would have changed the individual allocations and the final tier-four costs and created still another primary fully allocated program cost model (not shown here).

Post-SFAS No. 117 Alternative Reporting Formats

Although the program structure shown in these exhibits summarizes how higher education has traditionally looked at primary and support programs, many institutions have their own ideas and preferences. The following examples are presented to the Research University governing board as a basis for choosing the university's final reporting formats.

Figure 3.6: Model Four—Allocating Direct Support Costs at Research University to Primary Programs ($ in 1,000s)

Programs (A)	Tier One Before (B)	Support Costs (C)	New Tier One Costs (D)	Long-Term Debt Cost (E)	Tier Two (F)	One-Year Assets (G)	Tier Three (H)	Deprec. Cost (I)	Tier Four (New Audit) (J)	% of Personnel (K)	% of Tier One (L)	% Square Feet (M)
Primary												
Instruction	$77,425	$54,336	$131,761	$1,407	$133,168	$824	$133,992	$8,275	$142,267	34.55%	27.87%	32.98%
Research	32,520	13,806	46,326	528	46,854	261	47,115	1,225	48,340	12.85	11.71	11.26
Public Service	6,330	1,576	7,906	15	7,921	54	7,975	28	8,003	2.58	2.28	2.55
Auxiliary Enterprises	50,258	13,260	63,518	1,140	64,658	285	64,943	7,423	72,366	21.26	18.09	22.70
Total Primary	166,533	82,978	249,511	3,090	252,601	1,424	254,025	16,951	270,976	71.24	59.94	69.49
Support												
Academic Support	21,041	-21,041	0	23	23	315	338	358	696	5.25	7.57	4.58
Executive Administration	15,615	-11,124	4,491	0	4,491	58	4,549	212	4,761	6.75	5.62	3.55
Public Relations	11,255	-8,018	3,237	0	3,237	26	3,263	12	3,275	1.55	4.05	2.60
Student Services	20,447	-12,221	8,226	0	8,226	68	8,294	158	8,452	3.21	7.36	3.55
General Institutional	14,086	-8,443	5,643	0	5,643	158	5,801	122	5,923	4.42	5.07	2.38
O&M	22,025	-15,305	6,720	1,125	7,845	392	8,237	1,433	9,670	6.80	7.93	12.35
Other	6,825	-6,825	0	0	0	5	5	10	15	0.78	2.46	1.50
Total Support	111,294	-82,977	28,317	1,148	29,465	1,022	30,487	2,305	32,792	28.76	40.06	30.51
Total	277,827	1	27,828	4,238	282,066	2,446	284,512	19,256	303,767	100.00	100.00	100.00

Notes:

Added to:	**Instruction**	**Research**	**Public Service**	**Auxiliary Enterprises**	**Total**		
From Academic Support	$14,817	$6,224	$0	$0	$21,041	Direct	Column L
From Executive Administration	5,395	2,007	403	3,320	11,124	Personnel Compensation	Column K
From Public Relations	3,889	1,446	290	2,393	8,018	Personnel Compensation	Column K
From Student Service	12,221	0	0	0	12,221	Direct to Instruction	$12,221
From General Institutional	3,925	1,649	321	2,548	8,443	Direct Tier One	Column L
From O&M	7,264	2,480	562	5,000	15,305	% of Square Feet	Column M
From Other	6,825	0	0	0	6,825	Direct	Column L
Total	54,336	13,806	1,576	13,260	82,978		
Computations for Executive Administration							
From Executive Administration of $15,615, allocate to:	34.55%	12.85%	2.58%	21.26%	100.00 %	From Column K	
Equals	$5,395	$2,007	$403	$3,320	$11,124	See above	

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Figure 3.7: Model Five—Four-Tier Full Costs at Research University, with Direct Support Costs Allocated to Primary Cost Centers, Leaving Residual or Indirect Support Program Costs ($ in 1,000s)

Programs (A)	Figure 3.6 Tier One (B)	Support Costs (C)	New Tier One Costs (D)	Long-Term Debt Cost (E)	Tier Two (F)	One-Year Assets (G)	Tier Three (H)	Deprec. Cost (I)	Tier Four (New Audit) (J)	% of Personnel (K)	% of Tier One (L)	% Square Feet (M)
Primary												
Instruction	$131,761	$19,404	$151,165	$2,119	$153,284	$1,522	$154,806	$9,867	$164,673	52.82%	52.81%	61.25%
Research	46,326	3,110	49,436	598	50,034	378	50,412	1,338	51,750	21.25	18.57	6.25
Public Service	7,906	587	8,493	28	8,521	100	8,621	61	8,682	4.28	3.17	1.15
Auxiliary Enterprises	63,518	5,216	68,734	1,493	70,227	446	70,673	7,990	78,663	21.65	25.46	31.35
Total Primary	249,511	28,317	277,828	4,238	282,066	2,446	284,512	19,256	303,767	100.00	100.00	100.00
Support												
Academic Support	0	0	0	0	0	0	0	0	0			
Executive Administration	4,491	-4,491	0	0	0	0	0	0	0			
Public Relations	3,237	-3,237	0	0	0	0	0	0	0			
Student Services	8,226	-8,226	0	0	0	0	0	0	0			
General Institutional	5,643	-5,643	0	0	0	0	0	0	0			
O&M	6,720	-6,720	0	0	0	0	0	0	0			
Other	0	0	0	0	0	0	0	0	0			
Total Support	28,317	-28,317	0	0	0	0	0	0	0			
Total	277,828	0	277,828	4,238	282,067	2,446	284,513	19,256	303,767	100.00	100.00	100.00

Notes:

Added to:		Instruction Tier One	Research Tier One	Public Service Tier One	Auxiliary Enterprises Tier One	Total Tier One		
From Academic Support		$0	$0	$0	$0	$0	Direct	
From Executive Administration		2,372	954	192	972	4,491	% Personnel Compensation	Column K
From Public Relations		1,710	688	139	701	3,237	% Personnel Compensation	Column K
From Student Service		8,226	0	0	0	8,226	Direct	$8,226
From General Institutional		2,980	1,048	179	1,437	5,643	% Direct Tier One	Column L
From O&M		4,116	420	77	2,107	6,720	% of Square Feet	Column M
From Other		0	0	0	0	0	Direct	
Total Tier One		19,404	3,110	587	5,216	28,317		
Total Tier Two	$1,148	23				23	Direct	
		689	70	13	353	1,125	% of Square Feet	Column M
Total Tier Three	$1,022	365		26		391	Direct	
		333	117	20	161	631	% of Direct Tier One	Column L
Total Tier Four	$2,305	485		12		497	Direct	
		1,107	113	21	567	1,808	% of Square Feet	Column M
Total Allocated						4,475		
Sample Computation for Tier Two								
Allocate Tier Two on Basis of Square Feet from Column M		61.25%	6.25%	1.15%	31.35%	100.00%	From Column M	
To Be Allocated: $1,148								
Direct = $23; Percentage = $1,125								
Equals ($1.125 x percentage share)		$689	$70	$13	$353	$1,125		

The By-Function Model with Explicit Indirect Support Costs

The by-function model with explicit indirect support costs preserves the traditional by-function support accounts, isolates only true indirect costs, and thus ensures considerable historical trend continuity. The remaining indirect support costs ($28,317,000) are considerably smaller than those encountered in the pre-SFAS No. 117 version ($111,294,000, from figures 3.3 and 3.4) because primary programs now reflect support costs, which had been pooled.

The following summary single-column cost statement, figure 3.8, uses figure 3.6 data. In this version, tier-two through tier-four costs have not been allocated. *Total Tier One* shows the operating result, and *Total Tier Four* highlights the excess of current revenues over costs, excluding certain transfers to and from funds.

Figure 3.8: Summary Single-Column Presentation of Four-Tier Full Costs of Primary and Support Programs at Research University ($ in 1,000s)

Tiers	Items and Programs	Cost Tiers	P&L Balance
	Current Revenues		$308,723
One	Instruction	$131,761	
	Research	46,326	
	Public Service	7,906	
	Auxiliary Enterprises	63,518	
	Total Primary Programs	249,511	59,212
	Executive Administration	4,491	
	Public Relations and Development	3,237	
	Student Services	8,226	
	General Institutional	5,643	
	O&M	6,720	
	Total Support	28,317	30,895
	Total Tier One	277,828	30,895
Two	Long-Term Debt Cost	4,238	
	Total Tier Two	282,066	26,657
Three	One-Year Assets	2,446	
	Total Tier Three	284,512	24,211
Four	Depreciation	19,256	
	Total Tier Four	303,767	4,956

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.9, also based on figure 3.6 data, shows the same result after tier-two through tier-four costs have been allocated to primary and support activities. The multicolumn format provides a clearer picture of where tier-two through tier-four costs are being allocated. In both figures 3.8 and 3.9 the issue is how much, if any, support cost should be reported separately.

The Simplified By-Function Format With Primary Full Costs Only

Figure 3.10 is a summary report of model five (figure 3.7). Like figure 3.9, it is an FTFC model. In this format the four primary programs absorb all support costs.

Figure 3.9: Four-Tier Full-Cost Report by Major Functions at Research University, with All Costs Allocated to Primary and Support Activities ($ in 1,000s)

Programs	Tier One	Tier Two	Tier Three	Tier Four	Full Costs	P&L Balance
Current Revenues						$308,723
Instruction	$131,761	$1,407	$824	$8,275	$142,267	166,456
Research	46,326	528	261	1,225	48,340	118,116
Public Service	7,906	15	54	28	8,003	110,113
Auxiliary Enterprises	63,518	1,140	285	7,423	72,366	37,747
Total Primary	249,511	3,090	1,424	16,951	270,976	37,747
Academic Support	0	23	315	358	696	37,051
Executive Administration	4,491	0	58	212	4,761	32,290
Public Relations and Development	3,237	0	26	12	3,275	29,015
Student Services	8,226	0	68	158	8,452	20,563
General Institutional	5,643	0	158	122	5,923	14,640
O&M	6,720	1,125	392	1,433	9,670	4,970
Other	0	0	5	10	15	4,955
Total Support	28,317	1,148	1,022	2,305	32,792	4,955
Total	277,828	4,238	2,446	19,256	303,767	4,956

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.10: Four-Tier Summary Report for Research University Showing Primary Programs Costs Only ($ in 1,000s)

Programs	Tier One	Tier Two	Tier Three	Tier Four	Full Costs	P&L Balance
Current Revenues						$308,723
Instruction	$151,165	$2,119	$1,522	$9,867	$164,673	144,050
Research	49,436	598	378	1,338	51,750	92,300
Public Service	8,493	28	100	61	8,682	83,618
Auxiliary Enterprises	68,734	1,493	446	7,990	78,663	4,955
Total Primary	277,828	4,238	2,446	19,256	303,767	4,956

Note: Because of rounding, figures may not add up exactly to totals.

SFAS No. 117–Type Cost Report Formats Containing Support Costs

SFAS No. 117 does not prescribe a specific primary program chart of accounts. To date, all the sample reports offered by institutions use a mix of primary programs and a limited but varying number of support activities. Some institutions view some support activities, such as certain types of student services (e.g., advisement, student activities management), as primary activities. Whether the intent of SFAS No. 117 is to follow the example of figure 3.9 or figure 3.10 is not clear. If the latter, it may be some time before institutions comply fully with such a truncated primary program list.

If, over time, cost reports based on SFAS No. 117 contain fewer or no support-cost categories, differences in cost allocation practices will continue to haunt inter-institutional cost comparisons. Even if a future list of cost accounts resembles that shown in figure 3.10, it is not certain which specific costs will be reflected in each cost center in a post-SFAS No. 117 world.

Figure 3.11 suggests an alternative primary and support program cost report structure that would be acceptable under SFAS No. 117.

Figure 3.11: Selected By-Function Accounts in Audit Format

Function	
Primary Programs	Instruction, departmental research, other educational
	Sponsored research and contracts
	Libraries
	Educational functions of hospitals and other independent operations
Support Activities	Operations and maintenance of educational plant
	General administration and institutional
	Student services
Other	Auxiliary enterprises
	Hospitals
	All other

Note: Each account would have its tier-one through tier-four columns.

In the post-SFAS No. 117 world, each institution starts not only from its unique accounting base, but also from its own cost allocation tradition. To date, figures 3.9 and 3.11 reflect tradition, whereas figure 3.10 points to some future ideal where costs are reported strictly for an institution's primary programs.

Alternative Allocation Bases and Their Effects on Tier-One Costs

Simplicity and economy are powerful incentives when colleges and universities allocate pooled costs. As shown above, simple percentage allocation of pooled costs always sacrifices some costing precision. It is relatively simple to enhance costing precision without abandoning percentage allocation of pooled costs.

Allocating Pooled Costs on the Basis of Their Natural Costs

Support costs normally represent cost combinations for personnel, consumables, and sometimes long-term debt costs and asset depreciation. Percentage allocation can transfer such costs in two ways:

First, the most simple type of percentage cost transfer, used in the preceding exhibits, prorates a support cost to one or several other accounts in lump sums without paying attention to their natural-cost structures. This method is also used to prevent the double counting of costs. For certain costing purposes, it is also the least precise cost allocation approach.

Second, costing precision is maximized when costs are allocated to cost centers in direct proportion to their natural-cost structure. This is called kind-for-kind cost allocation. Ideally, this means that indirect or support travel costs are allocated to direct travel costs, that indirect utility costs are allocated to direct utility costs, and that indirect or support personnel costs are allocated to direct personnel costs. In other words, the cost pool is transferred, line by line, on the basis of percentage shares of each type of natural costs identified by the budget. This way, the natural cost structure is not distorted.

But such precision in transferring costs may be asking too much, and there is a simpler way that at least reduces the cost structure distortion resulting from the most common indirect-cost allocation practices. Figure 3.12 divides natural direct costs into two broad categories: total personnel costs and total consumables costs. The objective is to allocate $22,025,000 of O&M costs.

Figure 3.12: Prorating Costs in Proportion to Natural-Cost Lines at Research University ($ in 1,000s)

Cost Center	Personnel	Consumable	Tier One
Instruction	$56,133	$21,292	$77,425
O&M Allocation	11,288	10,737	22,025
Total	67,421	32,029	99,450
Percentage Shares	67.79%	32.21%	100.00%
O&M Allocation %	51.25%	48.75%	100.00%
O&M Allocation			$22,025

In this example, the pre-allocation shares of instructional personnel and consumables are 72.50 and 27.50 percent, respectively. Because the shares for O&M personnel and consumables are different—51.25 and 48.75 percent—the final post-allocation percentages for instruction are 67.79 and 32.21. This kind-for-kind natural-cost allocation procedure reflects accurately the final percentage shares of total tier-one personnel and consumables resources.

When, as in figures 3.6 and 3.7, an entire support department's cost is transferred to a primary program—academic support, admissions, and registrar's office—natural kind-for-kind cost transfers can be accomplished easily. When only a portion of a support department's costs are transferred, this more complicated approach would transfer natural costs the appropriate proportions.

How much costing precision should one strive for? Whenever support costs are transferred to primary programs without kind-for-kind natural-cost distinctions—for instance, through a lump-sum prorating mechanism—the percentage weights for personnel compensation and consumables are changed. Worse, if the full cost being transferred includes tier-two through tier-four cost elements, the percentage transfer obscures the structure of costs even more. The virtue of the FTFC model is precisely that it can keep such lump-sum distortions to a minimum.

Only a few of the examples which follow employ this type of kind-for-kind natural-cost allocation procedure. Research University may consider this alternative in the interest of preserving the integrity of the natural-cost structure when it reports the full natural costs of its primary programs.

Allocating Executive Administration Costs: A Comparative Analysis

Cost distortions for inter-institutional cost comparisons can originate innocently enough and early in the cost allocation process. The allocation of executive administration costs is a case in point.

How executive administration costs are allocated may not be the most pressing cost allocation problem faced by institutions, but it highlights well the post-allocation cost differences that result when there is a choice among allocation bases for one type of cost. Executive administration costs are a subset of institutional support costs. Institutions have always charged a certain percentage of their executive administration costs to various by-function cost centers. The most common practice is to charge a significant portion of these costs to auxiliary enterprises. Institutions differ in how they allocate these costs. Figure 3.13 shows how five different allocation procedures affect the costs of auxiliary enterprises. Three broad types of executive administration cost allocations are used:

- A portion of executive administration costs is allocated only to auxiliary enterprises.
- Executive administration costs are allocated to all by-function cost centers.
- Executive administration costs are allocated to primary cost centers only.

The six allocation examples shown produce five different executive administration costs that must be allocated.

Figure 3.13: Summary Comparison of Five Allocation Methods for Executive Administration Costs and the Effect on Auxiliary Enterprise Costs ($ in 1,000s)

To Auxiliary Enterprises Only	A	Arbitrary 25 percent of executive administration costs shift to auxiliary enterprises	$3,904
	B	Auxiliary enterprises direct-cost percentage	$2,825
To All Cost Centers	C	Percentage shares of personnel compensation	$2,767
	D	Direct or tier-one costs	$2,993
	E	Same as C with personnel/consumables distinction	$2,545
To Primary Cost Centers Only	F	Same as C	$3,381

Figure 3.14 stipulates that 25 percent of total executive administration costs be allocated solely to auxiliary enterprises. This practice is simple and direct. In this example, $3,904,000 of total executive administration costs shifts to auxiliary enterprises. Educational and general (E&G) tier-one costs decline to $216,840,000, and executive administration costs decline to $11,711,000.

Figure 3.14: Allocating 25 Percent of Executive Administration Costs at Research University to Auxiliary Enterprises ($ in 1,000s)

Cost Centers	Tier-One Costs Before Allocation	Allocating 25% of Executive Administration	Tier-One Costs After Allocation
Instruction	$77,425		$77,425
Research	32,520		32,520
Public Service	6,330		6,330
Academic Support	21,041		21,041
Student Services	20,447		20,447
Public Relations and Development	11,255		11,255
Executive Administration	15,615	-$3,904	11,711
Other Institutional Support	14,086		14,086
O&M	22,025		22,025
Total E&G Direct Costs	220,744		216,840
Auxiliary Enterprises	50,258	3,904	54,162
All Other	6,825		6,825
Total	277,827		277,827

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.15 allocates executive administration costs on the basis of auxiliary enterprise's tier-one or direct cost percentage share. The executive administration share allocated is $2,825,000, or $1,079,000 less than in figure 3.15. Total E&G tier-one costs rise to $217,919,000.

Figure 3.16 illustrates the effect on final tier-one costs when total personnel compensation is the allocation base. The auxiliary enterprises share of executive administration costs changes again to $2,767,000, the executive administration account ends up with a zero balance because the entire component has been allocated to all the other cost centers, and E&G tier-one costs are now $217,855,000.

Figure 3.17 uses tier-one or direct costs as an allocation base for executive administration costs, since direct costs are stipulated in Office of Management and Budget Circular A-21 as an appropriate allocation base.[2] The amount allocated to auxiliary enterprises is now $2,993,000.

Finally, figure 3.18 allocates executive administration costs on the basis of the percentage shares of personnel compensation and consumables. The amount of executive administration costs allocated to auxiliary enterprises is $2,137,000 for personnel compensation costs and $408,000 for consumables costs, for a total of $2,545,000, reflecting the precise percentage of total executive administration for personnel compensation and consumables.

Figure 3.15: Allocating Executive Administration Costs at Research University to Auxiliary Enterprises on the Basis of Auxiliary Enterprises' Tier-One or Direct-Cost Share ($ in 1,000s)

Cost Centers	Tier-One Costs Before Allocation	Allocating % of Auxiliary Enterprises' Direct Costs	Tier-One Costs After Allocation
Instruction	$77,425		$77,425
Research	32,520		32,520
Public Service	6,330		6,330
Academic Support	21,041		21,041
Student Services	20,447		20,447
Public Relations and Development	11,255		11,255
Executive Administration	15,615	-$2,825	12,790
Other Institutional Support	14,086		14,086
O&M	22,025		22,025
Total E&G Direct Costs	220,744		217,919
Auxiliary Enterprises	50,258	2,825	53,083
All Other	6,825		6,825
Total	277,827		277,827
Auxiliaries as a % of Total Direct Costs	22.77%		

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.16: Allocating Executive Administration Costs at Research University to All Cost Centers on the Basis of Personnel Compensation Percentage Shares ($ in 1,000s)

Cost Centers	Direct Costs Before Allocation	Allocating by % of Personnel Compensation	Allocating % of All Personnel Compensation	Direct Costs After Allocation
Instruction	$77,425	36.52%	$5,703	$83,128
Research	32,520	13.85	2,163	34,683
Public Service	6,330	6.91	1,078	7,408
Academic Support	21,041	5.25	820	21,861
Student Services	20,447	6.78	1,059	21,506
Public Relations and Development	11,255	3.07	479	11,734
Executive Administration	15,615	0.00	-15,615	0
Other Institutional Support	14,086	3.27	511	14,597
O&M	22,025	5.85	913	22,938
Total E&G Direct Costs	220,744	81.50	-2,889	217,855
Auxiliary Enterprises	50,258	17.72	2,767	53,025
All Other	6,825	0.78	122	6,947
Total	277,827	100.00	0	277,827

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.17: Executive Administration Costs at Research University Allocated on the Basis of Tier-One or Direct Costs ($ in 1,000s)

Cost Centers	Tier-One Costs Before Allocation	% of Tier-One Costs	Allocating Amounts	Tier-One Costs After Allocation
Instruction	$77,425	29.53%	$4,611	$82,036
Research	32,520	12.40	1,937	34,457
Public Service	6,330	2.41	377	6,707
Academic Support	21,041	8.02	1,253	22,294
Student Services	20,447	9.78	1,527	21,974
Public Relations	11,255	2.31	361	11,616
Executive Administration	15,615	0.00	-15,615	0
Other Institutional Support	14,086	5.37	839	14,925
O&M	22,025	8.40	1,312	23,337
Total E&G Direct Costs	220,744	78.23	-3,399	217,345
Auxiliary Enterprises	50,258	19.17	2,993	53,251
All Other	6,825	2.60	406	7,231
Total	277,827	100.00	0	277,827

Note: Because of rounding, figures may not add up exactly to totals.

Figure 3.18: Dividing Tier-One Costs at Research University on the Basis of Personnel Compensation and Consumables or Natural Cost Categories ($ in 1,000s)

Cost Centers	Personnel	Consumables	Executive Administration Personnel	Executive Administration Consumables	Tier One
Instruction	$56,133	$21,292	$4,872	$339	$82,636
Research	26,505	6,015	2,300	96	34,916
Public Service	4,495	1,835	390	29	6,749
Academic Support	7,175	13,866	623	221	21,885
Student Services	13,802	6,645	1,198	106	21,751
Executive Administration	14,011	1,604	-14,011	-1,604	0
Institutional Support	3,215	10,871	279	173	14,538
Public Relations and Development	8,779	2,476	762	38	12,055
O&M	14,315	7,710	1,242	123	23,390
Total E&G	148,430	72,314	-2,345	-480	217,920
Auxiliary Enterprises	24,625	25,633	2,137	408	52,803
All Other	2,389	4,436	208	71	7,104
Total	175,444	102,383	0	0	277,827

Note: Executive administration costs are allocated to all cost centers on the basis of their percentage shares of personnel compensation and consumables.

Figure 3.19 compares the five sets of tier-one costs that result from these cost allocation approaches. Even though executive administration costs represent a relatively small percentage of total operating costs (5.62 percent), the significant post-allocation tier-one cost differences should give any cost allocation theorist pause: Which of the allocated costs—and, therefore, of the resulting tier-one costs—is the correct one?

Figure 3.19: Comparing Post-Allocation Tier-One Costs at Research University ($ in 1,000s)

Cost Centers	Figure 3.14	Figure 3.15	Figure 3.16	Figure 3.17	Figure 3.18
Instruction	$77,425	$77,425	$83,128	$82,036	$82,636
Research	32,520	32,520	34,683	34,457	34,916
Public Service	6,330	6,330	7,409	6,707	6,749
Academic Support	21,041	21,041	21,861	22,294	21,885
Student Services	20,447	20,447	21,506	21,974	21,751
Public Relations and Development	11,255	11,255	11,734	11,616	0
Executive Administration	11,711	12,790	0	0	14,538
Other Institutional Support	14,086	14,086	14,597	14,925	12,055
O&M	22,025	22,025	22,938	23,337	23,390
E&G Direct Costs	216,840	217,919	217,856	217,346	217,920
Auxiliary Enterprises	54,162	53,083	53,025	53,251	52,803
All Other	6,825	6,825	6,947	7,231	7,104
Total	277,827	277,827	277,827	277,827	277,827

Note: Because of rounding, figures may not add up exactly to totals.

Allocating All Support Costs Only to Primary Cost Centers

Figure 3.20 uses tier-one primary program costs that result after executive administration costs have been allocated only to primary programs. The remaining total support costs of $95,679,000 are allocated on the basis of personnel compensation. However, since the remaining support costs are transferred without regard to each cost component's proper affinity-based allocation base, the resulting post-allocation tier-one costs are quite arbitrary. Figure 3.20 is an example of quick-and-dirty costing where precision is not required.

Alternative Allocation of Support Costs Using Multiple Allocation Bases

Figure 3.21 illustrates one possible alternative, with program cost outcomes that are different from those shown before. This iterative model uses multiple allocation bases.

Allocating Tier-Two Through Tier-Four Costs After the Fact

Long-Term Debt Costs

The most logical allocation base for aggregate plant-debt costs is the value of the debt in question, as illustrated in figure 3.22. For instance, if a dormitory has been debt-financed in full or in part, the total net debt cost must be charged to it. If debt encompasses more than one facility, the debt cost should be shared in proportion to each facility's percentage of the total (shared) debt.

Costs caused by plant debt are direct costs even if they are pooled. Under SFAS No. 117, this cost could be charged directly to cost centers which have debt-financed plant. Debt costs of instructional plant will be charged to instruction rather than to O&M, and debt costs of

Figure 3.20: Allocating Remaining Support Costs at Research University to Primary Programs on the Basis of Personnel Compensation ($ in 1,000s)

Functions	Tier-One Costs Before Allocation	% of Personnel Compensation Costs	Allocating Amounts	Tier-One Costs After Allocation
Instruction	$85,673	52.82%	$50,538	$136,211
Research	35,838	21.25	20,332	56,170
Public Service	6,998	4.28	4,095	11,093
Auxiliary Enterprises	53,639	21.65	20,715	74,354
Total Primary	182,148	100.00	95,679	277,827
Academic Support	21,041		-21,041	0
Executive Administration	15,615		-15,615	0
Public Relations and Development	11,255		-11,255	0
Student Services	20,447		-20,447	0
Institutional Support	14,086		-14,086	0
O&M	22,025		-22,025	0
All Other	6,825		-6,825	0
Total Support	111,294		-111,294	0
Total	293,442		-15,615	277,827

research facilities will be charged to research. Only direct O&M plant debt costs will be charged to the O&M account.

Normally, the plant in question is identified by the debt instruments drawn up at the time of debt acquisition. Each debt instrument clearly identifies the financing of the construction project that is the basis for the debt costs. Assigning debt costs is straightforward until one has to divide such costs among more than one facility or project.

Because the debt costs of long-term facilities normally relate to specific facilities projects, normally this cost should not be charged to or averaged out over plant that is debt-free. The percentage shares of total or assigned square footage among the various functional accounts are completely independent of the value of any plant debt. Figure 3.22 shows the percentage-share differences. When the same cost aggregate is distributed on the basis of each column, the allocated costs will differ in each case.

If the cost of long-term debt must be reflected in the activities costs of services rendered within a given debt-financed facility, then square footage, credit hours, and other suitable cost allocation bases can be used.

Not all long-term debt is acquired to finance physical facilities. Long-term debt costs that are not related to physical assets should be charged to the activities supported by the debt. For instance, if long-term debt supports an ongoing institutionally financed student loan program, debt costs are uniquely related to this program.

Debt costs derive from debt of different vintages with different interest rates. In figure 3.22, non-auxiliary-enterprise debt is listed by vintages. There are four different groupings of instruction-related debt. For instance, the O&M account was initially charged interest of $207,000 (5.51 percent) for $3,755,000 of debt issued to finance renovation of an instructional facility. It was also charged $348,000 (6.57 percent) of interest for another instructional facility's debt of $5,295,000. Of the two debt vintages, the smaller debt

Figure 3.21: Allocating Support Costs at Research University Using Multiple Allocation Bases ($ in 1,000s)

Step	Action	Cost Centers Primary Programs	Tier-One Cumulative	% of Base	Total Allocated	Tier-One Costs
		Previously Allocated Executive Administration Costs	$15,615			
First	*Allocate*	Student Services + Academic Support Basis: Direct	41,488			
		Instruction	85,673		$41,488	$127,161
		Research	35,838			35,838
		Public Service	6,998			6,998
		Auxiliary Enterprises	53,639			53,639
		Cumulative Subtotal	182,148		41,488	223,636
Second	*Allocate*	Public Relations and Development Basis: Total Tier-One Costs	11,255			
		Instruction	127,161	52.82%	5,945	133,106
		Research	35,838	21.25	2,392	38,230
		Public Service	6,998	4.28	482	7,480
		Auxiliary Enterprises	53,639	21.65	2,437	56,076
		Cumulative Subtotal	223,636	100.00	11,256	234,892
Third	*Allocate*	Institutional Support Basis: Total Personnel Compensation	14,086			
		Instruction	133,106	52.82	7,440	140,546
		Research	38,230	21.25	2,993	41,223
		Public Service	7,480	4.28	603	8,083
		Auxiliary Enterprises	56,076	21.65	3,050	59,126
		Cumulative Subtotal	234,892	100.00	14,086	248,978
Fourth	*Allocate*	O&M Basis: Total Square Feet Occupied	22,025			
		Instruction	140,546	61.25	13,490	154,036
		Research	41,223	6.25	1,377	42,600
		Public Service	8,083	1.15	253	8,336
		Auxiliary Enterprises	59,126	31.35	6,905	66,031
		Cumulative Subtotal	248,978	100.00	22,025	271,003
Fifth	*Allocate*	All Other Basis: To Instruction	6,825			
		Instruction	154,036		6,825	160,861
		Research	42,600			42,600
		Public Service	8,336			8,336
		Auxiliary Enterprises	66,031			66,031
		Cumulative Subtotal	271,003		6,825	277,828

Figure 3.22: Long-Term Debt Costs at Research University Allocated on the Basis of Percentage Shares of Debt Dollar Values ($ in 1,000s)

Plant with Debt by Function	Amount of Debt O&M	% Share of Debt	Amount of Debt Cost	% Share of Net Debt Costs	% Square Feet Plant with Debt
Instruction	$3,755	5.38%	$207	4.88%	5.10%
O&M	355	0.51	29	0.68	1.30
Instruction	5,295	7.59	348	8.21	3.95
Instruction	2,985	4.28	202	4.77	9.50
Academic Support	725	1.04	49	1.16	2.60
Instruction	1,515	2.17	95	2.24	3.75
Research	2,215	3.18	138	3.26	4.25
Institutional Support	1,055	1.51	72	1.70	3.20
Subtotal	17,900	25.66	1,140	26.90	33.65
Student Housing	25,825	37.03	1,625	38.34	35.25
Food Services	14,805	21.23	775	18.29	24.55
Other	3,015	4.32	205	4.84	1.85
Subtotal	43,645	62.58	2,605	61.47	61.65
All Other	8,200	11.76	493	11.63	4.70
Total	69,745	100.00	4,238	100.00	0.00
Public Service*	225	0.37	16	3.80	1.35

* $225 should be charged to public service.

represented a larger share of the total square footage with debt (5.10 percent), whereas the larger debt related to a smaller debt-encumbered square footage (3.95 percent). Similar differences are shown in the exhibit for the other debt vintages.

Therefore, when square footage is the allocation base, the ensuing cost allocation no longer emphasizes the dollar value of the debt in question, but the size of the facilities to which debt costs are allocated. Square footage often is an appropriate allocation base for costs that must be distributed within a debt-financed structure; it is a less appropriate base for allocating debt costs among structures and large by-function programs. Thus, if an institution has decided to pool debt and its related costs, and then later allocates these costs on a basis other than the debt's dollar value, the resulting primary or support program costs will be distorted.

The step-down cost allocation method charges debt cost first to each debt-financed facility. When debt costs are allocated to primary by-function programs, most of the cost will normally be divided between instruction and auxiliary enterprises. For the portion of debt cost that spills over into research and public service, institutions should first be guided by the terms of the original financing, which normally identifies the values of the projects covered by debt. If the documentation provides insufficient or no clues to the value distribution of the debt in question, the square footage method is appropriate, though less desirable, for allocating any debt segments not assigned to instruction. Research University assigns debt costs directly to each project and facility originally financed with debt.

Hierarchies Among Cost Categories

Full costs always come in clusters. These clusters exist at different levels of cost aggregation, with institutionwide costs embracing everything and departmental costs concentrating on relatively narrow cost concerns.

If instruction and sponsored research are the primary activities, the following are sources of support costs:

Public service
Academic support
Libraries
Academic computer services
Student services
Institutional support
Operations and maintenance

If student recruitment is the primary activity, the following may contribute support costs:

Undergraduate and graduate admissions
Student records, registrar
Student financial aid administration
Faculty involved in recruiting
Publications and printing department
Office services
Custodial services
Catering
Alumni (recruiting) relations
Specialized professional services
Computer services

If a three-year fund-raising effort is the primary activity, the following provide support:

Trustee- and alumni-relations department
Development department
Public relations and publicity
Specialized professional services
Computer services
Financial administration

The true art in costing is to dissect the types of support-cost pools illustrated here and to allocate them to the activities in question in a logical manner. Most of the support costs in these illustrations are direct costs for the costing task involved, and relatively few will actually prove to be indirect costs per se.

The simplified cost allocation examples shown earlier are essentially of the after-the-fact variety. Inter-account cost transfers taking place prior to pooling are a given. Many institutions already have elaborate from-the-bottom-up allocation systems where pooled and indirect cost transfers are ongoing or current so that full or nearly full costs are achieved at the end of each accounting interval.

Here, the issue is how, once an institution reports its by-function or major program costs in its year-end audit report, specific support and common costs can be allocated to its primary programs without the need for reorganizing its entire accounting system. This is exactly the assignment given by Research University's Board of Trustees, and the approaches illustrated above apply to all institutions that might face a similar costing task.

Smaller institutions may have less difficulty assigning debt costs directly to primary programs than do large and complex institutions with very diverse facilities debt and complex plant usage. Nevertheless, for maximum costing precision, even in those much more complicated situations, all debt costs should be allocated directly, first on the basis of the actual dollar value of the debt and second, perhaps as a last resort, on the basis of square footage.

One-Year Assets

Separating one-year assets from both consumables and long-lived assets may seem like an arbitrary and overly pedantic distinction. However, it derives directly from the difference between expenses and costs. Fully expensed asset acquisitions represent an expense of capital or an investment. Most fully expensed asset acquisitions have useful lives in excess of one year. The true explicit cost of the original capital investment is most simply and conventionally expressed through an appropriate depreciation charge; depreciation charges are a function of an asset's undepreciated value and its useful life.

Thus, rather than focusing on whether or not an asset acquisition was fully expensed and whether or not it was capitalized, the approach taken here is that, for costing purposes, all asset acquisitions should be depreciated on the basis of their respective original costs and useful lives—thus the distinction between one-year and longer-lived assets. If a group of peer institutions decides to compare full costs, this distinction enhances cost comparability among them by neutralizing differences in certain key financial policies.

For practical purposes, many fully expensed capital asset acquisitions have a very small dollar value. There are many of them, and tracking them all is onerous, to say the least. As indicated earlier, the Circular A-21 rule might be substituted here: All assets acquired currently that fall within the circular's cutoff point would constitute tier-three costs. But the Office of Management and Budget proposes to raise the cutoff from $500 to $5,000, at which point the range of covered equipment increases dramatically. The inventory of such items will then include personal computers, high-tech equipment, and large pools of equipment acquisitions whose useful lives clearly exceed one year.

Institutions may resist the extra work required to make the appropriate useful-life distinctions, but at the expense of precision in costing. Library, laboratory, and office equipment acquisitions are typical examples where useful lives normally vary and exceed one year. Changing to a $5,000 cutoff would also have the immediate effect of increasing current costs. For costing purposes, it does not seem to be necessary or appropriate to speed up the write-off of equipment with a useful life in excess of one year. When Research University computes its costs on the basis of the FTFC concept, all asset acquisitions with long useful lives are assumed to be depreciated.

Depreciation

Nevertheless, the complexity of tracking all such assets is recognized here. Figure 3.23 illustrates Research University's aggregate asset classification for determining depreciation allowances. The computation is based on a statistically representative sample of equipment, and it recognizes library and similar asset acquisitions with long useful lives and classifies plant assets into four major groups. Group A represents administrative and O&M plant, group B encompasses all auxiliary enterprises plant, and groups C and D are academic and research facilities. The equipment sample can be disaggregated to departments.

The computation of depreciation costs presents several challenges. Depreciation is a direct cost of doing business. If an institution pools its depreciation costs, the latter is an unallocated direct cost. If SFAS No. 117 intends to allocate all direct costs to primary programs or cost centers, depreciation costs must eventually be charged directly to each affected cost center. Until now, many institutions allocated depreciation costs respectively within the O&M and auxiliary enterprises accounts, if they were allocated at all. As indicated earlier, Research University charges these costs directly to the appropriate facilities and departments. If and when primary programs must reflect full costs, depreciation will have to be allocated directly to these programs.

Normally, the immediate cost center for equipment is a department. If an institution knows how to keep track of asset acquisitions by departments, departmental equipment depreciation costs will eventually aggregate into total equipment depreciation costs for each primary program. An allocation problem arises, however, when support activity depreciation costs must be allocated to primary cost centers. For instance, on what basis should Research University's depreciation costs in academic support, institutional support, public relations and development, student services, and O&M be allocated to primary programs at the macro-level shown in the preceding exhibits? Figures 3.5 through 3.7 illustrated the step-by-step process that shifts

Phony Net Revenues and Depreciation

For-profit enterprises have learned to their profound chagrin that depreciation rates permitted by tax laws and other government regulations all too frequently understate the rate at which physical capital deteriorates in use. Many for-profit businesses are forced by regulators to report what *Forbes* magazine calls "phony" earnings. In an article titled "Honesty Isn't Such a Bad Policy," author Riva Atlas points out that when lower depreciation rates are imposed by regulators (and tax authorities) they will increase reported pre-tax profits and therefore increase taxes.* She points out the obvious, that drawn-out depreciation schedules reduce current reported costs because they hide the fact that true profits are less than they would be with faster, usually more realistic, depreciation schedules.

Vis-à-vis higher education and indirect cost recovery, the government has an incentive to reimburse less rather than more. Stingy depreciation rates allowed under Circular A-21 for those using the simplified method or a facilities-use charge accomplish the government's purpose, but may short change colleges and universities. Unfortunately, many institutions also prefer to report low costs, and thus believe they are well served by low depreciation charges.

A financially sound approach would stress realistic depreciation charges. Many depreciable assets wear out faster than the authorities say. More-honest annual depreciation charges may reduce net profits in the short-run, but they also will call attention to the need for more appropriate pricing, revenue, and operating cost policies. The cash-flow report, mandated by SFAS No. 117, highlights depreciation as a reduction in cash flow at the very top of the list of deductions. Thus, keeping depreciation low eats up less cash flow. By reporting honest depreciation costs, college and university cash-flow reports will impart a more realistic message about an institution's financial condition and help ensure that in the future there are adequate current revenues to cover full costs.**

* Riva Atlas, "Honesty Isn't Such a Bad Policy," in *Forbes*, 4 July 1994, 118.

**See also Hans H. Jenny and G. Richard Wynn, *The Turning Point: A Study of Income and Expenditure Growth and Distribution of 48 Four-Year Liberal Arts Colleges, 1960–1970* (Wooster, Ohio: The College of Wooster, 1972). Hans H. Jenny, Geoffrey C. Hughes, and Richard D. Devine, *Hang-Gliding or Looking for an Updraft: A Study of College and University Finance in the 1980s—The Capital Margin* (Wooster, Ohio: The College of Wooster; Boulder, Colo.: John Minter Associates, 1981). These studies, preceding the requirement that independent institutions account for depreciation, made clear that even modest depreciation charges against current revenues would engulf higher education in a sea of red ink.

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depreciation costs to primary programs.

Beyond square-footage allocation, depreciation costs can also be allocated on the basis of employee and student usage. The last two bases, allowed under Circular A-21, are especially useful when the full cost of a course or of a research project is at stake, and when the focus is on a primary academic program.

Useful-Life Estimates

Useful-life estimates should be realistic and not overly long. Long useful lives are sometimes preferred because they reduce the size of the depreciation charge. Figure 3.23 .estimates what the administration of Research University believes are realistic remaining useful lives. Circular A-21, on the other hand, imposes arbitrary and overly long useful-life parameters for institutions using either the simplified indirect costing method or a facilities-use charge in lieu of a depreciation charge. While uniform across-the-board rates may be appealing because of their simplicity, they may result in too high or too low a depreciation cost when the full cost of specific programs and activities must be determined.

Depreciation rates are determined chiefly by—

- the original dollar value of the assets that are being depreciated and
- the remaining useful life of each asset.

The two most prominent macro-cost allocation bases for depreciation are—

- the dollar value of the assets and
- the square footage of plant.

For some costing tasks, credit hours and the number of personnel may be appropriate. The choice of allocation base and the useful-life estimates together determine how precise the eventual depreciation cost will be.

Institutions looking for simplicity in costing prefer average, across-the-board, depreciation rates. But which average rates? Figure 3.23 uses data from the preceding table and calculates two types of useful-life averages. Each results in a different depreciation cost. Using a $514,208 historical undepreciated asset value as a base, the annual average depreciation cost could be $19,947,000 or $19,256,000. The difference of $691,000, or 3.59 percent, between these two methods might be construed as significant by the institution.

Research University uses a useful-life-weighted average which produces an aggregate average useful life of 26.70 years (total plant value divided by $19,256,000), whereas the arithmetic average is 25.78 years (see figure 3.24). This method is consistent with the university's Circular A-21 depreciation computations. Under SFAS No. 117 and with responsibility or cost-center costing (and budgeting), depreciation cost pools become program-specific.

Figure 3.23: Depreciation Schedule Based on Remaining Useful Life of Assets at Research University ($ and sq. ft. in 1,000s)

Asset Type and Class	Assets (Number)	Value of Sample	Remaining Life Years	Undepreciated Value	Year-Weighted Depreciation
Equipment Sample					
Microcomputers	621	$2,739	4.88	$5,895	$1,208
Computers - Other	187	2,337	6.59	6,220	944
Other Data Processors	403	1,702	6.79	3,286	484
Vehicles, A	35	266	7.51	798	106
Vehicles, B	17	42	9.25	185	20
Office Equipment	110	566	8.56	1,132	132
Classrooms	118	524	7.53	1,457	193
Office Furniture	51	305	11.82	2,875	243
Lab Furnishings	23	145	14.82	1,875	127
Dormitory Lounge	33	400	6.76	2,153	318
Broadcast	134	407	9.33	998	107
Scientific	67	253	12.84	1,872	146
Engineering	266	611	12.88	2,385	185
Printing, Copying	72	367	7.93	785	99
Printing Instruments	38	38	7.93	298	38
Specialty	11	77	5.35	355	66
Maintenance	108	295	9.03	1,256	139
Musical Instruments	10	13	7.10	215	30
PBX Switching	20	184	4.20	184	44
All Other	462	1,727	6.44	3,582	558
Total Equipment	2,786	12,998	8.38	37,816	5,188
Libraries					
Administrative Computers	12	527	7.21	527	73
Work Stations	89	896	5.26	1,475	280
Periodicals	NA	5,687	12.23	5,687	465
Book Collection	NA	11,923	15.65	11,923	762
Rare Books	NA	785	25.00	785	31
Special Installations	3	395	11.25	395	35
Total	104	20,213	12.77	20,792	1,647
Plant	Square Feet				
Parking	13,650	11,702	9.87	11,702	1,186
Group A	75,450	52,575	35.25	52,575	1,491
Group B	102,124	99,050	37.52	99,050	2,640
Group C	112,355	145,150	42.25	145,150	3,436
Group D	101,125	147,125	40.10	147,125	3,669
Total	404,704	455,602	33.00	455,602	12,421
Grand Total	407,594	488,813	25.78	514,208	19,256

Note: Because of rounding, figures may not add up exactly to totals

Figure 3.24: Average Versus Weighted Remaining-Life Years at Research University

Asset Type	Value	Arithmetic Average Years	Average Depreciation	Weighted Average Years	Average Depreciation
Equipment	$37,816	8.38	$4,513	7.29	$5,188
Libraries	20,792	12.77	1,628	12.62	1,647
Plant	455,602	33.00	13,806	36.68	12,421
Total	514,210	25.78	19,947	26.70	19,256

Notes

1. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for-Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993).
2. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21. Reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994).

Exercises

The worksheet below allows the reader to emulate the allocation rules discussed in this chapter. If an institution has developed a chart of accounts compatible with SFAS No. 117, it can be substituted for the nomenclature provided here.

If your institution's internal financial policies are less or more expensive than the most generous options permitted under Circular A-21, you may wish to compute full costs using various depreciation rules.

Worksheet 3.1: Allocating Selected Costs to Your Major Programs Under SFAS No. 117

Cost Centers	Tier One	Add Two	Tier Two	Add Difference	Tier Three	Add	Tier Four
Instruction							
Research							
Public Service							
Academic Support							
Student Services							
Executive Support							
Other Support							
O&M							
Total E&G							
Auxiliary Enterprises							
Other							
Total							
Current Revenue or Cashflow							
Balance							

— 4 —

The Aggregate Full Costs of Major Professional Academic Programs

This chapter continues to examine the case of Research University, addressing pooled cost allocation alternatives to major academic programs. The chapter begins by presenting the university's summary report to the board.

Summary of Academic Program Full-Cost Alternatives

This report presents several academic program cost models, one or several of which the university may use in the future for reporting its academic program costs.

A university can define its academic programs in several ways. Research University chooses its professional schools and programs because its chart of accounts, expenditure budgets, other accounting information, and nonfinancial records are organized on behalf of these professional entities.

Figure 4.1 identifies Research University's primary professional program and support costs as reported in the pre-SFAS No. 117 audit, with which the board is familiar. Figure 4.2 compares the full costs of four cost models. The models allocate support and other common costs progressively to the primary academic programs shown in figure 4.1. Each cost model selects specific cost allocation bases, and each sets the stage for the next costing iteration. If other allocation bases than those used are chosen, the cost outcomes will be different.

Definition of the Costing Tasks

Under its practice of responsibility-center, or cost-center, budgeting, the university allocates support and other costs fully in the annual operating budget of each primary program. Responsibility budgeting or the full costing of primary academic programs implies that there are no "free" resources. Academic programs, as defined in figure 4.1, must account or pay for the university's total costs on the theory that without its academic mission and programs the institution would not exist. Thus, there are no institutional resources or costs per se.

Figure 4.3 presents a spreadsheet for tier-one costs and identifies total support costs that must be allocated in some manner to each academic program. Figure 4.4 illustrates a similar preadsheet for allocating tier-two through tier-four costs. The eventual cost allocations are identified by question marks.

Figure 4.1: Research University's Pre-SFAS No. 117 Academic Program and Administrative Support Centers ($ in 1,000s)

Cost Centers	Tier-One Costs	Tier-One % Shares E&G	Tier-One % Shares Total
Primary Programs			
Architecture	$5,925	3.56%	2.13%
Arts and Sciences	18,975	11.39	6.83
Business and Economics	14,985	9.00	5.39
Education	9,885	5.94	3.56
Environmental Sciences	3,035	1.82	1.09
International Studies	3,725	2.24	1.34
Law and Public Affairs	8,380	5.03	3.02
Performing Arts	7,790	4.68	2.80
Nursing, Paramedical	7,875	4.73	2.83
Physical and Mathematical Sciences	6,367	3.82	2.29
Physical Education and Sports Medicine	10,253	6.16	3.69
Social and Behavioral Sciences	12,750	7.66	4.59
Total E&G	109,945	66.02	39.57
Auxiliary Enterprises	50,258	30.18	18.09
Other	6,330	3.80	2.28
Total Primary	166,533	100.00	59.94
Support Activities			
Academic Support	3,984		1.43
Libraries	11,807		4.25
Academic Computer Services	5,250		1.89
Executive Administration	15,615		5.62
General Institutional	14,086		5.07
Student Services	20,447		7.36
Public Relations and Development	11,255		4.05
O&M	22,025		7.93
Other	6,825		2.46
Total Support	111,294		40.06
Total Program Costs	277,827		100.00
Capital Costs			
Long-Term Debt Costs	4,238		
One-Year Assets	2,446		
Depreciation	19,256		
Total Capital	25,940		
Total Full Costs	303,767		

Note: Because of rounding, figures may not add up exactly to totals.

Research University's Choice of Allocation Bases for Academic Program Costs

Within the four-tier full-cost (FTFC) model and under SFAS No. 117, most cost allocation issues pertain to tier one or operating costs. Some of these are pooled or unallocated direct costs of the various support functions, while others are truly indirect pooled support costs. On what basis should these direct and indirect costs be allocated to the primary academic programs? Figure 4.5 presents an expanded list of cost types and their respective allocation bases.

Figure 4.2: Research University's Academic Program Full-Cost Comparisons ($ in 1,000s)

Cost Centers	Model One Fig. 4.6	Model Two Fig. 4.8	Model Three Fig. 4.9	Model Four Fig. 4.10
Primary Programs				
Architecture	$6,448	$6,448	$13,917	$14,316
Arts and Sciences	24,432	23,925	55,126	56,815
Business and Economics	16,486	16,486	30,242	30,834
Education	9,903	10,058	16,487	16,737
Environmental Sciences	3,051	3,135	6,549	6,669
International Studies	3,732	3,792	6,593	6,681
Law and Public Affairs	9,085	9,085	18,721	18,972
Performing Arts	8,626	8,739	14,528	14,693
Nursing, Paramedical	7,952	8,008	11,690	11,838
Physical and Mathematical Sciences	7,568	7,482	14,600	14,799
Physical Education and Sports Medicine	11,139	11,139	18,443	18,715
Social and Behavioral Sciences	13,026	13,151	21,941	22,236
Total	121,448	121,448	228,837	233,305
Auxiliary Enterprises	60,222	60,222	64,126	64,126
Other	6,336	6,336	6,336	6,336
Total	188,006	188,006	299,300	303,767
Support Activities				
Academic Support	4,002	4,097	113	0
Libraries	13,005	13,549	1,742	0
Academic Computer Services	5,557	5,624	374	0
Executive Administration	16,621	15,695	80	0
General Institutional	14,631	14,629	543	0
Student Services	20,510	20,564	117	0
Public Relations and Development	11,273	11,298	43	0
O&M	23,324	23,468	1,443	0
Other	6,838	6,837	12	0
Total	115,761	115,761	4,467	0
Total Costs	303,767	303,767	303,767	303,767

This exhibit suggests that allocating support and other costs to primary academic programs can be considerably more complicated than allocating them to the major administrative functions, especially when a high degree of costing precision is required. Many more allocation-base alternatives exist. For practical purposes, this report cannot show the effects on full costs of every possible combination of allocation bases and therefore is limited to four costing models.

The general principles and constraints underlying the allocation of pooled direct and indirect costs are the same as for by-function macro-costing. To a large extent, the widening choice among increasing numbers and types of allocation bases is related, first, to the acknowledged need for more direct and less indirect costing, and second, to the desire for more costing precision. Both tendencies call attention to allocation bases that have a high—not merely a reasonable—degree of affinity with the cost center to which costs must be allocated. The allocation bases of the cost models in this report were chosen because they tend to enhance costing precision.

Figure 4.3: Research University's Spreadsheet for Tier-One Costs Before Allocating Direct Support Costs to Major Academic Programs ($ in 1,000s)

Cost Centers	Instruction	Spon. Rsrch.	Public Service	Aux. Ent.	Total Tier One	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Oth.	Total Supp.
Architecture	$4,645	$1,095	$99	$86	$5,925	?	?	?	?	?	?	?	?	?	?
Arts and Sciences	11,311	5,257	78	2,329	18,975	?	?	?	?	?	?	?	?	?	?
Business and Economics	9,105	3,607	328	1,945	14,985	?	?	?	?	?	?	?	?	?	?
Education	7,211	2,526	35	113	9,885	?	?	?	?	?	?	?	?	?	?
Environmental Sciences	1,735	1,157	18	125	3,035	?	?	?	?	?	?	?	?	?	?
International Studies	1,325	1,543	121	736	3,725	?	?	?	?	?	?	?	?	?	?
Law and Public Affairs	7,115	555	55	655	8,380	?	?	?	?	?	?	?	?	?	?
Performing Arts	5,840	1,235	123	492	7,690	?	?	?	?	?	?	?	?	?	?
Nursing, Paramedical	7,086	731	0	58	7,875	?	?	?	?	?	?	?	?	?	?
Physical and Mathematical Sciences	4,115	2,096	48	108	6,367	?	?	?	?	?	?	?	?	?	?
Physical Education and Sports Medicine	8,117	2,078	0	58	10,253	?	?	?	?	?	?	?	?	?	?
Social and Behavioral Sciences	9,468	3,189	25	68	12,750	?	?	?	?	?	?	?	?	?	?
Total E&G	77,073	25,069	930	6,773	109,845	?	?	?	?	?	?	?	?	?	?
Auxiliary Enterprises	5,330	1,295	248	43,485	50,358	?	?	?	?	?	?	?	?	?	?
Other	-4,978	6,156	5,152	0	6,330	?	?	?	?	?	?	?	?	?	?
Total	77,425	32,520	6,330	50,258	166,533	$3,984	$11,807	$5,250	$15,615	$14,086	$20,447	$11,255	$22,025	$6,825	$111,294
Support Costs															
Academic Support	?	?	?	?	3,984										
Libraries	?	?	?	?	11,807										
Academic Computer Services	?	?	?	?	5,250										
Executive Administration	?	?	?	?	15,615										
General Institutional	?	?	?	?	14,086										
Student Services	?	?	?	?	20,447										
Public Relations and Development	?	?	?	?	11,255										
O&M	?	?	?	?	22,025										
Other	?	?	?	?	6,825										
Total	?	?	?	?	111,294										
Capital Costs															
Grand Total	?	?	?	?	277,827										

Note: Every question mark indicates a potential addition to or deduction from the particular cost line. Under the step-down method, tiers-two through tier-four costs are first allocated to each support account and then distributed among the primary programs. Once all support costs have been allocated, the entire block of question marks will have a value of zero.

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Figure 4.4: Research University's Spreadsheet for Allocating Tier-One Through Tier-Four Costs ($ in 1,000s)

Cost Centers	Tier-One Direct Costs	Tier-One Allocated Costs	Tier-One Total Costs	Long-Term Debt Costs	Tier-Two Total Costs	One-Year Assets	Tier-Three Total Costs	Depreciation	Tier-Four Total Costs
Architecture	$5,925	?	?	?	?	?	?	?	?
Arts and Sciences	18,975	?	?	?	?	?	?	?	?
Business and Economics	14,985	?	?	?	?	?	?	?	?
Education	9,885	?	?	?	?	?	?	?	?
Environmental Sciences	3,035	?	?	?	?	?	?	?	?
International Studies	3,725	?	?	?	?	?	?	?	?
Law and Public Affairs	8,380	?	?	?	?	?	?	?	?
Performing Arts	7,690	?	?	?	?	?	?	?	?
Nursing, Paramedical	7,875	?	?	?	?	?	?	?	?
Physical and Mathematical Sciences	6,367	?	?	?	?	?	?	?	?
Physical Education and Sports Medicine	10,253	?	?	?	?	?	?	?	?
Social and Behavioral Sciences	12,750	?	?	?	?	?	?	?	?
Total E&G	109,945	?	?	?	?	?	?	?	?
Auxiliary Enterprises	50,258	?	?	?	?	?	?	?	?
Other	6,330	?	?	?	?	?	?	?	?
Total	166,533	$111,294	$277,827	$4,238	?	$2,446	?	$19,256	?
Support Costs									
Academic Support	3,984	-3,984	0	?	?	?	?	?	?
Libraries	11,807	-11,807	0	?	?	?	?	?	?
Academic Computer Services	5,250	-5,250	0	?	?	?	?	?	?
Executive Administration	15,615	-15,615	0	?	?	?	?	?	?
General Institutional	14,086	-14,086	0	?	?	?	?	?	?
Student Services	20,447	-20,447	0	?	?	?	?	?	?
Public Relations and Development	11,255	-11,255	0	?	?	?	?	?	?
O&M	22,025	-22,025	0	?	?	?	?	?	?
Other	6,825	-6,825	0	?	?	?	?	?	?
Total	111,294	-111,294	0	?	?	?	?	?	?
Capital Costs	25,940	-25,940	0	?	?	?	?	?	?
Grand Total	303,767	-25,940	277,827	4,238	282,065	2,446	284,511	19,256	303,767

Note: Every question mark indicates a potential addition to or deduction from the particular cost line. Under the step-down method, tier-two through tier-four costs are first allocated to each support account and then distributed among the primary programs. Once all support costs have been allocated, the entire block of question marks will have a value of zero.

Figure 4.5: Allocating Research University's Support and Indirect Costs to Primary Programs; Potential Allocation Bases

Cost Centers		Allocation Bases
Academic Support	*General*	Personnel compensation
	Libraries	Student credit hours
		Factor combining student/faculty usage
	Computer Support	Automated or other usage measure
		Factor combining student/faculty usage
Executive Administration		Personnel compensation
Public Relations and Development	*Public Relations*	Personnel compensation
		Direct or tier-one cost
	Development	Personnel compensation
		Percentage of gifts received by each program
Student Services	*General*	Personnel compensation
		Head count enrollment per program
	Admissions	Matriculation percentage shares
		FTE Enrollment
	Registrar, Student Records	Head count enrollment
		Student credit hours
		Percentage of degrees granted
	Student Financial Aid	Percentage of students on aid
		Percentage of student aid applications handled
		Percentage of matriculating students
		Student credit hours
		Personnel compensation
Operations and Maintenance		Total or assigned square footage
		FTE student enrollment
		Credit hours generated
Auxiliary Enterprises (Room-and-Board-Related only)		Percentage share of revenue generated
		Percentage of students housed and/or students with food service contracts
Net Long-Term Debt Costs		Direct to plant with debt
		Per student credit hour
		Percentage of FTE students
		Percentage of FTE student and staff factor
		Per square foot of total or assigned space
One-Year Assets		Direct to plant account or acquiring program
		Per student credit hour
		Percentage of FTE students
		Percentage of FTE student and staff factor
		Per square foot of total or assigned space
Depreciation (Historical Undepreciated Asset Value of Plant and Equipment)		Direct to plant for plant assets (including equipment) and direct to programs for equipment and other acquisitions
		Total or assigned square footage
		Combination of above two options
		Direct as percentage of student credit hours
		Direct as percentage of FTE students

Note: Some of these allocation bases are best suited for micro-costing, others are most appropriate for macro-costing.

Model One: The Standard FTFC Model Allocating Tier-Two Through Tier-Four Costs to Primary and Support Cost Centers

This model (figure 4.6) illustrates a pre-SFAS No. 117 cost condition in that it displays both primary and support program costs. It constitutes the basis for all subsequent models in this report and focuses principally on where the step-down method originally allocates tier-two through tier-four costs. The note in the exhibit identifies the allocation bases used.

In general, all tier-two through tier-four costs are allocated directly to the respective primary academic and support cost centers. Some academic programs do not have their own facilities and thus should absorb a share of the capital costs which this model charges only to the primary programs that have such facilities.

The issue of how to allocate shared capital costs is best illustrated by the many different ways depreciation costs can be computed. Figure 4.5 identified several depreciation cost allocation bases. Figure 4.7 illustrates four depreciation cost alternatives (columns B through E). The cost differences are striking.

Research University is a large institution with a diverse inventory of plant and equipment. Some facilities are very old, but have been renovated periodically. Historical facility values range from modest to high, and most important, some academic programs enjoy conspicuously more modern facilities than others. Which of the costing approaches shown provides the most accurate picture of the distribution of depreciation costs?

Square footage is the most popular base and yields the most precise allocated costs when the allocation takes place within rather than among programs and facilities. The two square footage illustrations (columns D and E) bear little relationship to the actual asset values that must be depreciated, but when separate square footage bases are used for the educational and general, auxiliary enterprises, and support accounts, and all shared facilities costs are properly distributed, distortions are somewhat smaller. Any averaging of support depreciation costs, as in the example of the libraries, understates the direct depreciation cost and can force other functions to absorb unrealistic amounts of depreciation. The four examples suggest that the combined base for value plus square footage for shared facilities appears to be the most accurate. Since Research University maintains a detailed equipment and facilities inventory, its accounting and budgeting system routinely allocates tier-two through tier-four costs directly to each facility and to each department. Thus, little or no averaging of depreciation costs occurs among groups of accounts.

Model Two: Model One Modified by Allocating All Shared Tier-Two Through Tier-Four Costs Among Primary Cost Centers

Relying in part on data from figure 4.7, figure 4.8 presents primary academic and support program costs after shared tier-two through tier-four costs have been allocated among primary academic program cost centers. The depreciation cost equivalent of the share of program space occupied is transferred from the host to the sharing program. Tier-two through tier-four support costs are not yet affected in this alternative.

Model Three: Allocating All Tier-One Support Costs to the Primary Academic Programs

This model (Figure 4.9) allocates support costs using a mixture of allocation bases. The unallocated support-cost balances are much smaller in this example. Figure 4.10 presents the allocations and identifies the allocation bases used. The exhibit lists each support cost account and shows how the total cost of each support function is allocated to the various academic programs. Only tier-one costs are being allocated here. Figure 4.11 provides the tier-two through tier-four allocation details.

Figure 4.6: Research University's Model-One FTFC Matrix for Tier-One Through Tier-Four Costs of Primary and Support Programs ($ in 1,000s)

Cost Centers	Tier-One Direct Costs	Long-Term Debt Costs	One-Year Assets	Depreciation Costs	Total Tier-Four Costs
Primary Programs					
Architecture	$5,925	$185	$23	$315	$6,448
Arts and Sciences	18,975	815	225	4,417	24,432
Business and Economics	14,985	892	185	424	16,486
Education	9,885	0	15	3	9,903
Environmental Sciences	3,035	0	15	1	3,051
International Studies	3,725	0	5	2	3,732
Law and Public Affairs	8,380	0	26	679	9,085
Performing Arts	7,790	135	125	576	8,626
Nursing, Paramedical	7,875	0	55	22	7,952
Physical and Mathematical Sciences	6,367	250	42	909	7,568
Physical Education and Sports Medicine	10,253	0	95	791	11,139
Social and Behavioral Sciences	12,750	0	76	200	13,026
Total E&G	109,945	2,277	887	8,339	121,448
Auxiliary Enterprises	50,258	1,493	475	7,996	60,222
Other	6,330	0	5	1	6,336
Total Primary	166,533	3,770	1,367	16,336	188,006
Support Activities					
Academic Support	3,984	0	15	3	4,002
Libraries	11,807	35	125	1,038	13,005
Academic Computer Services	5,250	150	146	11	5,557
Executive Administration	15,615	0	15	991	16,621
General Institutional	14,086	0	320	225	14,631
Student Services	20,447	0	55	8	20,510
Public Relations and Development	11,255	0	15	3	11,273
O&M	22,025	283	376	640	23,324
Other	6,825	0	12	1	6,838
Total Support	111,294	468	1,079	2,920	115,761
Total Costs	277,827	4,238	2,446	19,256	303,767

Note: Long-term debt costs are allocated directly to plant and equipment financed with debt. One-year assets are charged directly to the acquiring departments. Depreciation is allocated on the basis of the actual depreciation rates for each asset class and charged directly to each department. Shared facilities costs have not yet been allocated.

Figure 4.7: Four Depreciation Methods for Research University ($ in 1,000s)

Cost Centers (A)	Model One Value Base (B)	Model Two Value Plus Square Feet for Shared Facilities (C)	Square Foot Method for Pooled Depreciation Costs (D)	Square Foot Method Separating Key Functions (E)
Primary Programs				
Architecture	$315	$315	$818	$749
Arts and Sciences	4,417	3,910	2,551	2,334
Business and Economics	424	424	1,007	921
Education	3	158	485	444
Environmental Sciences	1	85	439	402
International Studies	2	62	381	349
Law and Public Affairs	679	679	678	620
Performing Arts	576	689	625	571
Nursing, Paramedical	22	78	24	22
Physical and Mathematical Sciences	909	823	620	567
Physical Education and Sports Medicine	791	791	815	745
Social and Behavioral Sciences	200	325	674	616
Total E&G	8,339	8,339	9,117	8,340
Auxiliary Enterprises	7,996	7,996	3,091	7,996
Other	1	1	175	1
Total Primary	16,336	16,336	12,383	16,337
Support Activities				
Academic Support	4	98	722	307
Libraries	1,636	1,582	1,026	436
Academic Computer Services	11	78	570	242
Executive Administration	3	65	497	211
General Institutional	265	223	786	334
Student Services	3	62	813	345
Public Relations and Development	3	28	491	209
O&M	995	784	1,781	757
Other	0	0	187	79
Total Support	2,920	2,920	6,873	2,920
Total Costs	19,256	19,256	19,256	19,256

Note: Column B: Facilities sharing programs show only equipment depreciation.
Column C: Sharing programs show depreciation costs in direct proportion to square feet they occupy.
Column D: Prorates depreciation costs in proportion to total square feet.
Column E: Does the same thing but within each "functional" group.
Model Two shows the most precise method

Model Four: Allocating All Support Costs to Primary Academic Programs

One conceivable post-SFAS No. 117 full-cost version is depicted in figure 4.12, where all support costs have been fully allocated to the primary academic programs. There remain no residual support costs. Figure 4.13 supplies the allocation detail for the remaining tier-two through tier-four costs.

Figure 4.8: Research University's Model Two Academic Program Cost Allocating Tier-Two Through Tier-Four Costs Among Shared Facilities Only ($ in 1,000s)

Cost Centers	Tier-One Total Costs	Long-Term Debt Costs	One-Year Assets	Depreciation Costs	Total Tier-Four Costs
Primary Programs					
Architecture	$5,925	$185	$23	$315	$6,448
Arts and Sciences	18,975	815	225	3,910	23,925
Business and Economics	14,985	892	185	424	16,486
Education	9,885	0	15	158	10,058
Environmental Sciences	3,035	0	15	85	3,135
International Studies	3,725	0	5	62	3,792
Law and Public Affairs	8,380	0	26	679	9,085
Performing Arts	7,790	135	125	689	8,739
Nursing, Paramedical	7,875	0	55	78	8,008
Physical and Mathematical Sciences	6,367	250	42	823	7,482
Physical Education and Sports Medicine	10,253	0	95	791	11,139
Social and Behavioral Sciences	12,750	0	76	325	13,151
Total E&G	109,945	2,277	887	8,339	121,448
Auxiliary Enterprises	50,258	1,493	475	7,996	60,222
Other	6,330	0	5	1	6,336
Total Primary	166,534	3,770	1,367	16,336	188,006
Support Activities					
Academic Support	3,984	0	15	98	4,097
Libraries	11,807	35	125	1,582	13,549
Academic Computer Services	5,250	150	146	78	5,624
Executive Administration	15,615	0	15	65	15,695
General Institutional	14,086	0	320	223	14,629
Student Services	20,447	0	55	62	20,564
Public Relations and Development	11,255	0	15	28	11,298
O&M	22,025	283	376	784	23,468
Other	6,825	0	12	0	6,837
Total Support	111,294	468	1,079	2,920	115,761
Total Costs	277,827	4,238	2,446	19,256	303,767

Note: Only depreciation costs are affected in this example. Square foot costs are transfered from host to sharing facility. Because of rounding, figures may not add up exactly to totals.

Figure 4.14 is a spreadsheet showing an array of percentage distributions for various allocation bases used in models one through four.

Summary Academic Program Cost Reports

Research University's administration recommends that the governing board consider the FTFC models illustrated in figures 4.9 through 4.13 as a basis for future discussions of how the university should eventually report its full academic program costs. If all support and formerly pooled costs must be integrated into each academic program, figure 4.12 may represent the appropriate example. If the university must continue to provide support cost details by functions, a decision must be made concerning the extent of indirect versus direct or pooled versus allocated costing. A spreadsheet of the type shown in figure 4.11 would appear to be suitable and would ensure time series continuity between pre- and post-SFAS No. 117 reporting.

Figure 4.9: Research University's Model Three Academic Program Cost Allocating Tier-One Support Costs to Primary Academic Programs ($ in 1,000s)

Cost Centers	Tier-One Total Costs	Long-Term Debt Costs	One-Year Assets	Depreciation Costs	Total Tier-Four Costs
Primary Programs					
Architecture	$13,394	$185	$23	$315	$13,917
Arts and Sciences	50,176	815	225	3,910	55,126
Business and Economics	28,741	892	185	424	30,242
Education	16,314	0	15	158	16,487
Environmental Sciences	6,449	0	15	85	6,549
International Studies	6,526	0	5	62	6,593
Law and Public Affairs	18,016	0	26	679	18,721
Performing Arts	13,579	135	125	689	14,528
Nursing, Paramedical	11,557	0	55	78	11,690
Physical and Mathematical Sciences	13,485	250	42	823	14,600
Physical Education and Sports Medicine	17,557	0	95	791	18,443
Social and Behavioral Sciences	21,540	0	76	325	21,941
Total E&G	217,334	2,277	887	8,339	228,837
Auxiliary Enterprises	54,162	1,493	475	7,996	64,126
Other	6,330	0	5	1	6,336
Total Primary	277,827	3,770	1,367	16,336	299,300
Support Activities					
Academic Support	0	0	15	98	113
Libraries	0	35	125	1,582	1,742
Academic Computer Services	0	150	146	78	374
Executive Administration	0	0	15	65	80
General Institutional	0	0	320	223	543
Student Services	0	0	55	62	117
Public Relations and Development	0	0	15	28	43
O&M	0	283	376	784	1,443
Other	0	0	12	0	12
Total Support	0	468	1,079	2,920	4,467
Total Costs	277,827	4,238	2,446	19,256	303,767

Note: Because of rounding, figures may not add up exactly to totals.

Figure 4.10: Research University's Model Three Spreadsheet Showing Support-Program Detail and Support-Cost Allocation Bases ($ in 1,000s)

Cost Centers	Instruction	Spon. Rsrch.	Public Service	Aux. Ent.	Tier-One Direct Costs	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Other Supp.	Total Supp.	Total Tier One
Primary Programs																
Architecture	$4,645	$1,095	$99	$86	$5,925	$327	$1,006	$447	$711	$1,155	$883	$595	$1,977	$368	$7,469	$13,394
Arts and Sciences	11,311	5,257	78	2,329	18,975	1,537	1,619	720	2,276	5,436	7,521	4,751	6,164	1,178	31,201	50,176
Business and Economics	9,105	3,607	328	1,945	14,985	408	1,399	622	1,773	1,444	2,625	2,122	2,433	930	13,756	28,741
Education	7,211	2,526	35	113	9,885	292	668	297	826	1,031	1,467	62	1,172	614	6,429	16,314
Environmental Sciences	1,735	1,157	18	125	3,035	140	541	240	283	494	399	68	1,061	188	3,414	6,449
International Studies	1,325	1,543	121	736	3,725	102	416	185	266	361	320	0	921	231	2,801	6,526
Law and Public Affairs	7,115	555	55	655	8,380	89	1,512	673	1,656	314	1,822	1,413	1,637	520	9,636	18,016
Performing Arts	5,840	1,235	123	492	7,690	129	856	381	538	458	825	610	1,509	484	5,789	13,579
Nursing, Paramedical	7,086	731	0	58	7,875	170	616	274	557	600	918	0	58	489	3,682	11,557
Physical and Mathematical Sciences	4,115	2,096	48	108	6,367	169	1,438	639	836	599	960	584	1,498	395	7,118	13,485
Physical Education and Sports Medicine	8,117	2,078	0	58	10,253	281	629	280	764	994	1,051	700	1,968	636	7,304	17,557
Social and Behavioral Sciences	9,468	3,189	25	68	12,750	339	1,106	492	1,226	1,200	1,656	351	1,628	791	8,790	21,540
Total E&G	77,073	25,069	930	6,773	109,845	3,984	11,807	5,250	11,711	14,806	20,447	11,255	22,025	6,825	107,390	217,335
Auxiliary Enterprises	5,330	1,295	248	43,485	50,358	0	0	0	3,904	0	0	0	0	0	3,904	54,162
Other	-4,978	6,156	5,152	0	6,330	0	0	0	0	0	0	0	0	0	0	6,330
Total Primary	77,425	32,520	6,330	50,258	166,533	3,984	11,807	5,250	15,615	14,086	20,447	11,255	22,025	6,825	111,294	277,827
Support Activities																
Academic Support	3,152	832	0	0	3,984											
Libraries	6,798	4,994	15	0	11,807											
Academic Computer Services	2,735	2,515	0	0	5,250											
Executive Administration	10,150	1,465	565	3,435	15,615											
General Institutional	12,575	1,385	126	0	14,086											
Student Services	20,447	0	0	0	20,447											
Public Relations and Development	6,128	3,826	1,301	0	11,255											
O&M	14,686	5,232	2,107	0	22,025											
Other	6,825	0	0	0	6,825											
Total Support	83,496	20,249	4,114	3,435	111,294											
Grand Total	160,921	52,769	10,444	53,693	277,827											

Note: Each support cost category has its distinct allocation base:

Academic Support: Student credit hours, E&G only.

Libraries: Shares of weighted student/faculty ratio, shares of E&G only.

Academic Computer Services: Shares of weighted student/faculty ratio, shares of E&G only.

Executive Administration: 25 percent balance to auxiliary enterprises, balance to personnel compensation of E&G.

General Institutional: Student credit hour shares.

Student Services: Student credit hour shares and other.

Public Relations and Development: Percent of gifts raised on behalf of program.

O&M: Percent of square feet of E&G.

Other: Tier-one direct costs of E&G.

The percentage distributions can be found in Figure 4.14. Student services costs are a composite of the four cost centers identified below on the right side of this table. Please note that direct cost shares have been used only for *Other Support*.

Figure 4.11: Research University's Model Three Tier-One Through Tier-Four Primary and Support Program Costs ($ in 1,000s)

Cost Centers	Instruction	Spon. Rsrch.	Public Service	Aux. Ent.	Tier-One Direct Costs	Allocated Support Costs	Final Tier-One Costs	Long-Term Debt Costs	Tier-Two Costs	One-Year Assets	Tier-Three Costs	Deprec. Costs Val./Sq. Ft.	Tier-Four Costs
Primary Programs													
Architecture	$4,645	$1,095	$99	$86	$5,925	$7,469	$13,394	$185	$13,579	$23	$13,602	$315	$13,917
Arts and Sciences	11,311	5,257	78	2,329	18,975	31,201	50,176	815	50,991	225	51,216	3,910	55,126
Business and Economics	9,105	3,607	328	1,945	14,985	13,756	28,741	892	29,633	185	29,818	424	30,242
Education	7,211	2,526	35	113	9,885	6,429	16,314	0	16,314	15	16,329	158	16,487
Environmental Sciences	1,735	1,157	18	125	3,035	3,414	6,449	0	6,449	15	6,464	85	6,549
International Studies	1,325	1,543	121	736	3,725	2,801	6,526	0	6,526	5	6,531	62	6,593
Law and Public Affairs	7,115	555	55	655	8,380	9,636	18,016	0	18,016	26	18,042	679	18,721
Performing Arts	5,840	1,235	123	492	7,790	5,789	13,579	135	13,714	125	13,839	689	14,528
Nursing, Paramedical	7,086	731	0	58	7,875	3,682	11,557	0	11,557	55	11,612	78	11,690
Physical and Mathematical Sciences	4,115	2,096	48	108	6,367	7,118	13,485	250	13,735	42	13,777	823	14,600
Physical Education and Sports Medicine	8,117	2,078	0	58	10,253	7,304	17,557	0	17,557	95	17,652	791	18,443
Social and Behavioral Sciences	9,468	3,189	25	68	12,750	8,790	21,540	0	21,540	76	21,616	325	21,941
Total E&G	77,073	25,069	930	6,773	109,945	107,389	217,334	2,277	219,611	887	220,498	8,339	228,837
Auxiliary Enterprises	5,330	1,295	248	43,485	50,258	3,904	54,162	1,493	55,655	475	56,130	7,996	64,126
Other	-4,978	6,156	5,152	0	6,330	0	6,330	0	6,330	5	6,335	1	6,336
Total Primary	77,425	32,520	6,330	50,258	166,533	111,294	277,827	3,770	281,597	1,367	282,963	16,336	299,300
Support Activities													
Academic Support	3,152	832	0	0	3,984	-3,984	0	0	0	15	15	98	113
Libraries	6,798	4,994	15	0	11,807	-11,807	0	35	35	125	160	1,582	1,742
Academic Computer Services	2,735	2,515	0	0	5,250	-5,250	0	150	150	146	296	78	374
Executive Administration	10,150	1,465	565	3,435	15,615	-15,615	0	0	0	15	15	65	80
General Institutional	12,575	1,385	126	0	14,086	-14,086	0	0	0	320	320	223	543
Student Services	20,447	0	0	0	20,447	-20,447	0	0	0	55	55	62	117
Public Relations and Development	6,128	3,826	1,301	0	11,255	-11,255	0	0	0	15	15	28	43
O&M	14,686	5,232	2,107	0	22,025	-22,025	0	283	283	376	659	784	1,443
Other	6,825	0	0	0	6,825	-6,825	0	0	0	12	12	0	12
Total Support	83,496	20,249	4,114	3,435	111,294	-111,294	0	468	468	1,079	1,547	2,920	4,467
Grand Total	160,921	52,769	10,444	53,693	277,827	0	0	4,238	282,065	2,446	284,510	19,256	303,767

Note: Because of rounding, figures may not add up exactly to totals.

Figure 4.12: Research University's Model Four Spreadsheet Showing Full Allocation of Tier-Two Through Tier-Four Support Costs to Primary Programs ($ in 1,000s)

Cost Centers	Instr.	Spon. Rsrch.	Public Service	Aux. Ent.	Tier-One Direct Costs	Tier-One Support Costs	Total Tier-One Costs	Direct Long-Term Debt Costs	Support Long-Term Debt Costs	Tier-Two Costs	Direct One-Year Assets	Supp. One-Year Assets	Tier-Three Costs	Direct Deprec. Costs Val./Sq. Ft.	Supp. Deprec. Costs Val./Sq. Ft.	Tier- Four Costs
Primary Programs																
Architecture	$4,645	$1,095	$99	$86	$5,925	$7,469	$13,394	$185	$23	$13,602	$23	$57	$13,682	$315	$319	$14,316
Arts and Sciences	11,311	5,257	78	2,329	18,975	31,201	50,176	815	208	51,199	225	427	51,851	3,910	1,054	56,815
Business and Economics	9,105	3,607	328	1,945	14,985	13,756	28,741	892	189	29,822	185	122	30,129	424	281	30,834
Education	7,211	2,526	35	113	9,885	6,429	16,314	0	0	16,314	15	51	16,380	158	199	16,737
Environmental Sciences	1,735	1,157	18	125	3,035	3,414	6,449	0	0	6,449	15	24	6,488	85	96	6,670
International Studies	1,325	1,543	121	736	3,725	2,801	6,526	0	0	6,526	5	18	6,459	62	70	6,681
Law and Public Affairs	7,115	555	55	655	8,380	9,636	18,016	0	0	18,016	26	156	18,198	679	95	18,971
Performing Arts	5,840	1,235	123	492	7,790	5,789	13,579	135	17	13,731	125	57	13,913	689	91	14,692
Nursing, Paramedical	7,086	731	0	58	7,875	3,682	11,557	0	0	11,557	55	30	11,642	78	118	11,837
Physical and Mathematical Sciences	4,115	2,096	48	108	6,367	7,118	13,485	250	31	13,766	42	30	13,838	823	138	14,799
Physical Education and Sports Medicine	8,117	2,078	0	58	10,253	7,304	17,557	0	0	17,557	95	49	17,701	791	223	18,715
Social and Behavioral Sciences	9,468	3,189	25	68	12,750	8,790	21,540	0	0	21,540	76	59	21,675	325	236	22,237
Total E&G	77,073	25,069	930	6,773	109,945	107,389	217,334	2,277	468	220,079	887	1,079	222,045	8,339	2,920	233,304
Auxiliary Enterprises	5,330	1,295	248	43,485	50,258	3,904	54,162	1,493	0	55,655	475	0	56,130	7,996	0	64,126
Other	-4,978	6,156	5,152	0	6,330	0	6,330	0	0	6,330	5	0	6,335	1	0	6,336
Total Primary	77,425	32,520	6,330	50,258	166,533	111,294	277,827	3,770	468	282,065	1,367	1,079	284,511	16,336	2,920	303,767

Note: All support costs are now zeroed out. Tier-one through tier-four support (or indirect) costs are shown in their separate respective columns. Because of rounding, figures may not add up exactly to totals.

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Figure 4.13: Research University's Model Spreadsheet Showing Allocation Detail for Tier-Two Through Tier-Four Support Costs Remaining in Model Three ($ in 1,000s)

Depreciation	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Other	Total
Architecture	$38	$130	$6	$0	$18	$62	$0	$64	$0	$319
Arts and Sciences	10	610	30	15	86	0	0	303	0	1,054
Business and Economics	7	162	8	0	23	0	0	80	0	281
Education	3	116	6	0	16	0	0	57	0	199
Environmental Sciences	3	56	3	0	8	0	0	28	0	96
International Studies	2	40	2	0	6	0	0	20	0	70
Law and Public Affairs	3	35	2	32	5	0	0	17	0	95
Performing Arts	4	51	3	0	7	0	0	25	0	91
Nursing, Paramedical	4	67	3	0	9	0	0	33	0	118
Physical and Mathematical Sciences	7	67	3	18	9	0	0	33	0	138
Physical Education and Sports Medicine	7	112	6	0	16	0	28	55	0	223
Social and Behavioral Sciences	9	135	7	0	19	0	0	67	0	236
Total E&G	98	1,582	78	65	223	62	28	784	0	2,920
Allocation Bases	Std. Credit Hours	Std. Credit Hours	Std. Credit Hours	Direct	Std. Credit Hours	Direct	Direct	Std. Credit Hours		

One-Year Assets	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Other	Total
Architecture	$0	$0	$0	$0	$26	$0	$0	$31	$0	$57
Arts and Sciences	15	0	61	15	123	55	0	145	12	427
Business and Economics	0	0	50	0	33	0	0	39	0	122
Education	0	0	0	0	23	0	0	28	0	51
Environmental Sciences	0	0	0	0	11	0	0	13	0	24
International Studies	0	0	0	0	8	0	0	10	0	18
Law and Public Affairs	0	125	0	0	7	0	15	8	0	156
Performing Arts	0	0	34	0	10	0	0	12	0	57
Nursing, Paramedical	0	0	0	0	14	0	0	16	0	30
Physical and Mathematical Sciences	0	0	0	0	14	0	0	16	0	30
Physical Education and Sports Medicine	0	0	0	0	23	0	0	27	0	49
Social and Behavioral Sciences	0	0	0	0	27	0	0	32	0	59
Total E&G	15	125	146	15	320	55	15	376	0	1,079
Allocation Bases	Direct	Direct	% Share to Users	Direct	Std. Credit Hours	Direct	Direct	Std. Credit Hours	Direct	

Long-Term Debt Costs	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Other	Total
Architecture	$0	$0	$0	$0	$0	$0	$0	$23	$0	$23
Arts and Sciences	0	35	72	0	0	0	0	101	0	208
Business and Economics	0	0	79	0	0	0	0	111	0	189
Education	0	0	0	0	0	0	0	0	0	0
Environmental Sciences	0	0	0	0	0	0	0	0	0	0
International Studies	0	0	0	0	0	0	0	0	0	0
Law and Public Affairs	0	0	0	0	0	0	0	0	0	0
Performing Arts	0	0	0	0	0	0	0	17	0	17
Nursing, Paramedical	0	0	0	0	0	0	0	0	0	0
Physical and Mathematical Sciences	0	0	0	0	0	0	0	31	0	31
Physical Education and Sports Medicine	0	0	0	0	0	0	0	0	0	0
Social and Behavioral Sciences	0	0	0	0	0	0	0	0	0	0
Total E&G	0	35	150	0	0	0	0	283	0	468
Allocation Bases		Direct	% Share to Borrowers					% Share of Debt		

Figure 4.14: Research University's Spreadsheet of Cost Allocation Bases Highlighting Multiple Allocation Bases

Cost Centers	Tier-One Direct Costs	Total Depr. Asset Values	Total Square Feet	Square Feet %	Actual Depr. Rate	Student Credit Hours	Weighted Student/ Faculty Factor	% Shares of FTE Students	% Shares of New Matricu.	% Shares of Degrees Produced	% Shares of Students with Aid	Number of FTE Faculty	Number of FTE Students
Primary Programs													
Architecture	$5,925	$8,825	18,730	4.25%	4.028%	8.20%	12.51%	2.55%	1.85%	2.15%	3.55%	250	2,934
Arts and Sciences	18,975	132,040	58,393	13.25	3.725	38.59	37.08	45.16	45.18	46.52	40.32	4,419	32,232
Business and Economics	14,985	11,475	23,049	5.23	3.765	10.25	9.15	12.28	13.02	13.22	11.06	1,202	10,143
Education	9,885	35	11,106	2.52	7.541	7.32	6.82	5.26	7.04	6.22	7.81	515	9,099
Environmental Sciences	3,035	18	10,048	2.28	6.954	3.51	3.11	1.21	1.23	0.95	1.10	118	2,576
International Studies	3,725	21	8,726	1.98	7.213	2.56	2.40	1.85	0.85	0.83	1.12	181	5,142
Law and Public Affairs	8,380	17,625	15,513	3.52	4.025	2.23	4.29	8.55	9.12	8.92	7.22	837	6,534
Performing Arts	7,790	14,295	14,295	3.24	4.102	3.25	5.26	3.29	4.34	2.95	2.75	322	4,441
Nursing, Paramedical	7,875	545	545	0.12	4.012	4.26	3.98	4.26	4.28	3.28	5.15	416	7,969
Physical and Mathematical Sciences	6,367	22,698	14,191	3.22	4.005	4.25	3.85	4.75	3.08	3.82	6.38	465	3,818
Physical Education and Sports Medicine	10,253	21,525	18,642	4.23	3.675	7.06	4.27	4.29	3.26	3.29	6.29	419	7,861
Social and Behavioral Sciences	12,750	5,285	15,425	3.50	3.775	8.52	7.28	6.55	6.75	7.85	7.25	641	6,841
Total E&G	109,945	234,387	208,662	47.35		100.00	100.00	100.00	100.00	100.00	100.00	9,785	99,592
Auxiliary Enterprises	50,358	223,525	70,733	16.05	3.585								
Other	6,330	11	4,010	0.91	7.153								
Total Primary	166,533	457,923	283,405	64.31		100.00	100.00	100.00	100.00	100.00	100.00		
Support Activities													
Academic Support	3,984	49	16,526	3.75	6.820								
Libraries	11,807	22,819	23,490	5.33	5.001								
Academic Computer Services	5,250	129	13,045	2.96	8.510								
Executive Administration	15,615	35	11,370	2.58	7.001								
General Institutional	14,086	6,569	17,981	4.08	3.421								
Student Services	20,447	48	18,598	4.22	6.802								
Public Relations and Development	11,255	42	11,238	2.55	6.721								
O&M	22,025	26,587	40,765	9.25	3.534								
Other	6,825	7	4,275	0.97	6.922								
Total Support	111,294	56,285	157,287	35.69									
Capital Costs	25,940												
Grand Total	303,767	514,208	440,704	100.00	3.752								

Note: Because of rounding, figures may not add up exactly to totals.

Figure 4.14 (continued): Research University's Spreadsheet of Cost Allocation Bases Highlighting Multiple Allocation Bases

Cost Centers	Student / Faculty Ratio	% Shares of FTE Faculty	% Shares of Tier-One Costs	% Shares of Tier-One Costs	% Shares Tier-One Personnel Comp.	% Shares Tier-One Personnel Comp.	% Shares E&G Personnel Comp.	% Shares of Gifts Produced	% Shares of Total Employees	% Shares of Total Employees
Primary Programs										
Architecture	8.52%	417.87%	1.95%	3.56%	2.85%	4.95%	6.07%	5.29%	2.25%	4.11%
Arts and Sciences	13.71	4,590.14	6.25	11.39	8.23	15.85	19.43	42.21	7.35	14.26
Business and Economics	11.85	1,444.53	4.93	9.00	7.01	12.35	15.14	18.85	6.35	- 11.15
Education	5.66	1,295.78	3.25	5.94	3.11	5.75	7.05	0.55	3.75	4.92
Environmental Sciences	4.58	366.91	1.00	1.82	1.15	1.97	2.42	0.60	1.35	1.95
International Studies	3.52	732.28	1.23	2.24	1.23	1.85	2.27	0.00	1.67	1.65
Law and Public Affairs	12.81	930.50	2.76	5.03	6.45	11.53	14.14	12.55	5.11	10.15
Performing Arts	7.25	632.49	2.56	4.68	3.22	3.75	4.60	5.42	3.01	4.25
Nursing, Paramedical	5.22	1,134.91	2.59	4.73	3.55	3.88	4.76	0.00	3.12	3.95
Physical and Mathematical Sciences	12.18	543.68	2.10	3.82	6.05	5.82	7.14	5.19	4.25	6.29
Physical Education and Sports Medicine	5.33	1,119.50	3.38	6.16	3.35	5.32	6.52	6.22	3.22	6.74
Social and Behavioral Sciences	9.37	974.22	4.20	7.66	4.25	8.54	10.47	3.12	4.86	7.55
Total E&G	100.00	100.00	36.19	66.02	50.45	81.56	100.00	100.00	46.29	76.97
Auxiliary Enterprises			16.54	30.18	11.52	16.92			14.85	21.98
Other			2.08	3.80	0.95	1.52			1.25	1.05
Total Primary			54.82	100.00	62.92	100.00			62.39	100.00
Support Activities										
Academic Support			1.31		4.49			3.75		
Libraries			3.89		5.22			4.58		
Academic Computer Services			1.73		3.45			2.52		
Executive Administration			5.14		5.25			5.75		
General Institutional			4.64		3.39			4.05		
Student Services			6.73		5.72			6.55		
Public Relations and Development			3.71		3.99			4.11		
O&M			7.25		4.82			5.15		
Other			2.25		0.75			1.15		
Total Support			36.64		37.08			37.61		
Capital Costs			8.54		0.00			0.00		
Grand Total			100.00		100.00			100.00		

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Meeting the Affinity Test

In general, models three and four use allocation bases that have a very high degree of affinity, whereas the alternative relies heavily on tier-one percentage shares as an allocation base. Unless tier-one costs cause specific types of support costs and indirect costs, there is no real affinity. This illustration was chosen because the NACUBO literature cites tier-one or direct costs as an appropriate allocation base and because this base is part of the Circular A-21 allocation base package.

Models three and four use several enrollment-centered allocation bases. Enrollments directly affect academic support program costs. Of special interest is the combined student, credit-hour, FTE-faculty factor. This is a weighted percentage of student-faculty usage and is suitable for distributing various types of academic support costs. This factor is calculated by assigning weights respectively to credit hours generated and to faculty size. The weighted number is then expressed as a percentage of the total weighted numbers, and this percentage is finally used to allocate the cost in question. Such weighted numbers are used in modern responsibility center budgeting.*

For example, if a program (e.g., architecture) engenders 35,208 credit hours per year and library usage gives this program a weight of 1.5 for these credit hours, the weighted number is 52,812. These credit hours are related to 250 FTE faculty who, given their professional assignments with respect to library use, have a weight of 1.25, for a weighted number of 3,125. The weighted total is 38,333 or 12.51 percent of the total weighted number of 306,419.

* See Edward L. Whalen, *Responsibility Center Budgeting: An Approach to Decentralized Management for Institutions of Higher Education* (Bloomington, Ind.: Indiana University Press, 1991), chapters 5 and 6.

Figure 4.15 illustrates a simplified summary cost report that identifies only the primary academic programs and is based on figure 4.12.

Figure 4.15: Research University's FTFC Matrix for Primary Academic Programs ($ in 1,000s)

Cost Centers	Tier-One Costs	Long-Term Debt Costs	One-Year Asset Costs	Depreciation Costs	Total Tier-Four Costs
Primary Programs					
Architecture	$13.394	$208	$80	$634	$14.316
Arts and Sciences	50.176	1.023	652	4,964	56.815
Business and Economics	28,741	1.081	307	705	30.834
Education	16,314	0	66	357	16.737
Environmental Sciences	6,449	0	39	181	6.669
International Studies	6.526	0	23	132	6.681
Law and Public Affairs	18.016	0	182	774	18.972
Performing Arts	13.579	152	182	780	14.693
Nursing, Paramedical	11,557	0	85	196	11.838
Physical and Mathematical Sciences	13.485	281	72	961	14.799
Physical Education and Sports Medicine	17.557	0	144	1.014	18.715
Social and Behavioral Sciences	21,540	0	135	561	22.236
Total E&G	217.334	2.745	1.967	11.259	233.305
Auxiliary Enterprises	54,162	1.493	475	7.996	64.126
Other	6,330	0	5	1	6.336
Total Primary	277.827	4.238	2.446	19.256	303.767

Note: Because of rounding, figures may not add up exactly to totals.

Figure 4.15 is limited to cost information. Columns for assigned budgeted current revenues and for net revenues or losses before transfers could be added, but are not shown here.

Exercises

This exercise applies to institutions whose instructional and research program is divided into professional academic programs, similar to the ones used in the foregoing examples. It requires you to identify your institution's major academic program cost centers, compute your four-tier full costs for each of them, and allocate all support costs to these primary cost centers. (Institutions with principally undergraduate programs, please go to chapter 6).

1. Identify your primary and support cost centers and, for each cost center, define your preferred allocation base.

Worksheet 4.1: Primary and Support Cost Centers

Cost Centers	Allocation Base	Data Source(s)

2. Allocate all support costs to primary academic programs and allocate tier-two through tier-four costs using your SFAS No. 117 chart of accounts.

Worksheet 4.2: Allocating Support Costs to Primary Academic Programs ($ in 1,000s)

Cost Centers	Tier-One Direct Costs	Tier-One Allocated Support Costs	Final Tier-One Costs	Long-Term Debt Costs	Tier-Two Costs	One-Year Assets	Tier-Three Costs	Deprec. Costs	Tier-Four Costs
Primary Programs									
Support Activities									

— 5 —

Macro-Costing of Departments

This chapter illustrates Research University's approach to departmental full costing before and after the allocation of support costs. The example used is how the physical and mathematical sciences program allocates support and indirect costs to the Department of Chemistry. Because the allocation procedures are similar to those already illustrated, only the highlights of the process are mentioned. The principal source of information is the pre-SFAS No. 117 post-audit budget report before support costs have been allocated to primary programs.

Departmental costing represents the dividing line between from-the-top-down macro-costing and from-the-bottom-up micro-costing. The scope of support-cost allocation depends almost entirely on how much direct costing has already taken place. As noted earlier, Research University's current cost accounting system combines maximum direct costing with after-the-fact allocation of pooled direct and indirect costs.

Aggregate Full Costs of Physical and Mathematical Sciences

Figure 5.1 summarizes the full cost of the physical and mathematical sciences program using the four-tier full-cost (FTFC) model. *Percentage Share in Program* identifies the Department of Chemistry's percentage shares for the respective allocation bases. For instance, the department is responsible for 11.64 percent of the program's total credit hours. When this figure is multiplied by the program's total academic support cost of $169,000, the department is charged $20,000, and the remaining departments absorb the balance of $149,000. Tier-two and tier-three costs were charged directly, and tier-four costs—depreciation—were originally allocated on the basis of the department's share of assigned (or total) square feet.

This illustration is based on models three and four from chapter 4. The allocation bases

Figure 5.1: Research University's Physical and Mathematical Sciences Program Full Costs ($ in 1,000s)

Cost Centers	Total Program Costs	Allocation Base	% Share in Prog.	Department of Chemistry	All Other Departments
Primary Program Costs					
Personnel Compensation	$4,392	Direct from departmental budget		$392	$4,000
Consumables	1,975	Direct from departmental budget		229	1,746
Total Primary Tier One	6,367			621	5,746
Support Costs					
Academic Support	169	Student credit hours	11.64%	20	149
Libraries	1,438	Student/faculty factor	12.53	180	1,258
Academic Computer Services	639	Student/faculty factor	13.89	89	550
Executive Administration	836	Personnel compensation	8.34	70	766
General Institutional	599	Student credit hours	11.64	70	529
Student Services	960	Student credit hours	11.64	112	848
Public Relations and Development	584	Gifts raised	25.85	151	433
O&M	1,498	Assigned square feet	12.28	184	1,314
Other	395	Personnel compensation	8.34	33	362
Total Support Tier One	7,118			908	6,210
Total Tier One	13,485			1,529	11,956
Long-Term Debt Costs	250	Direct from departmental budget		84	166
Total Tier Two	13,735			1,613	12,122
One-Year Assets	42	Direct from departmental budget		11	31
Total Tier Three	13,777			1,624	12,153
Depreciation	823	Assigned square feet	12.28	101	722
Total Tier Four	14,600			1,725	12,875

Note: Column *Department of Chemistry* equals percentage in column *% Share in Program* times amount in column *Total Program Costs.*

for departmental cost allocation must be the same as or very similar to those used when pooled support costs in the aggregate are allocated to primary academic programs as shown in chapter 4.

Natural Tier-One Costs of Physical and Mathematical Sciences

Figure 5.2 disaggregates tier-one costs by natural or object-type costs. The exhibit shows the corresponding natural costs for the program as a whole, for the Department of Chemistry, and for the remaining departments not otherwise identified.

Figure 5.2: Research University Department of Chemistry Costs by Natural Tier-One Classifications ($ in 1,000s)

Cost Centers Natural Costs	Physical and Mathematical Sciences	Department of Chemistry	All Other Departments	Chemistry as % of Program
Personnel				
Salaries and Wages	$3,111	$285	$2,826	9.16%
Staff Benefits	996	83	913	8.30
Professional Services	285	24	261	8.42
Subtotal	4,392	392	4,000	8.92
Travel, Entertainment	199	27	172	13.57
Supplies, Academic	209	15	194	7.18
Supplies, Other	202	12	190	5.94
Repair and Replacement	226	32	194	14.16
Insurance	18	2	16	11.11
Printing	121	23	98	19.01
Computer Services	351	55	296	15.67
Postage, Freight	18	5	13	27.78
Coal, Other	0	0	0	0.00
Utilities Purchased	94	15	79	15.96
Telecommunication Services	189	40	149	21.16
Food Purchased	325	2	323	0.62
All Other	23	1	22	4.35
Subtotal	1,975	229	1,746	11.59
Total Direct Tier One	6,367	621	5,746	9.75
Support	7,118	908	6,210	12.76
Total Tier One	13,485	1,529	11,956	11.34
Long-Term Debt Costs	250	84	166	33.60
Total Tier Two	13,735	1,613	12,122	11.74
One-Year Assets	42	11	31	26.19
Total Tier Three	13,777	1,624	12,153	11.79
Depreciation	823	101	722	12.27
Total Tier Four	14,600	1,725	12,875	11.81

Note: Column Department of Chemistry equals column Chemistry *as % of Program* times column *Physical and Mathematical Sciences*. Column *All Other Departments* equals *Physical and Mathematical Sciences* minus *Department of Chemistry*. Natural costs come from post-audit budget report.

Normally, pooled and support costs are allocated to academic departments in a lump sum as shown in figure 5.1 (*Total Program Costs*). In figures 5.2 and 5.3, they are allocated, line by line, in direct proportion to each support activity's natural cost.

Figure 5.4, *Total Support Allocated*, shows the aggregate Department of Chemistry natural support-cost allocations. A matrix like that in figure 5.3 would yield details similar to those shown in figure 5.3. *Total Support Allocated* would correspond to *Total Support* of figure 5.3, except that the data would be for the Department of Chemistry only.

Figure 5.3: Allocating Tier-One Costs by Natural Costs for Physical and Mathematical Sciences at Research University ($ in 1,000s)

Cost Centers Natural Costs	Instruc.	Spon. Rsrch.	Public Service	Aux. Ent.	Phys. & Math. Sci. Costs	Acad. Supp.	Libs.	Acad. Com. Serv.	Exec. Admin.	Gen. Inst.	Studt. Serv.	PR and Dev.	O&M	Other	Total Supp.	Total Tier One
Personnel																
Salaries and Wages	$1,467	$1,394	$58	$192	$3,111	$71	$258	$95	$132	$118	$127	$39	$131	$0	$971	$4,082
Staff Benefits	468	462	17	49	996	18	72	27	42	29	28	11	29	0	256	1,252
Professional Services	217	23	0	45	285	3	15	10	25	65	21	14	3	13	169	454
Subtotal	2,152	1,879	75	286	4,392	92	345	132	199	212	176	64	163	13	1,396	5,788
Travel, Entertainment	151	15	10	23	199	24	35	42	85	48	168	157	28	23	610	809
Supplies, Academic	183	26	0	0	209	7	0	55	0	0	0	0	0	0	62	271
Supplies, Other	92	54	12	44	202	5	15	35	38	27	48	41	38	15	262	464
Repair and Replacement	118	73	2	33	226	15	28	65	47	75	15	8	68	6	327	553
Insurance	8	2	0	8	18	1	12	11	3	11	8	3	12	0	61	79
Printing	96	15	2	8	121	3	118	23	65	12	166	52	21	12	472	593
Computer Services	181	162	2	6	351	5	528	118	161	76	123	46	34	33	1,124	1,475
Postage, Freight	6	5	2	5	18	2	155	14	52	36	42	79	69	18	467	485
Coal, Other	0	0	0	0	0	0	0	0	0	0	0	0	714	0	714	714
Utilities Purchased	28	19	3	44	94	0	99	48	18	26	36	28	225	9	489	583
Telecommunication Services	112	36	5	36	189	10	82	87	116	58	136	61	75	24	649	838
Food Purchased	6	2	3	314	325	5	10	6	39	11	39	43	28	18	199	524
All Other	12	6	2	3	23	0	11	3	13	7	3	2	23	224	286	309
Subtotal	993	415	43	524	1,975	77	1,093	507	637	387	784	520	1,335	382	5,722	7,697
Total Tier One	3,145	2,294	118	810	6,367	169	1,438	639	836	599	960	584	1,498	395	7,118	13,485

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Figure 5.4: Natural Cost Classification of Support Costs Allocated to Research University's Department of Chemistry ($ in 1,000s)

Cost Centers Natural Costs	Physical and Mathematical Sciences	Department of Chemistry	Total Support Allocated	Total Department of Chemistry
Personnel				
Salaries and Wages	$3,111	$285	$198	$483
Staff Benefits	996	83	65	148
Professional Services	285	24	18	42
Subtotal	4,392	392	281	673
Travel, Entertainment	199	27	53	80
Supplies, Academic	209	15	38	53
Supplies, Other	202	12	47	59
Repair and Replacement	226	32	79	111
Insurance	18	2	12	14
Printing	121	23	63	86
Computer Services	351	55	99	154
Postage, Freight	18	5	46	51
Coal, Other	0	0	0	0
Utilities Purchased	94	15	68	83
Telecommunication Services	189	40	89	129
Food Purchased	325	2	28	30
All Other	23	1	5	6
Subtotal	1,975	229	627	856
Total Direct Tier One	6,367	621	908	1,529
Support	7,118			0
Total Tier One	13,485			1,529
Long-Term Debt Costs	250			0
Total Tier Two	13,735			1,529
One-Year Assets	42			0
Total Tier Three	13,777			1,529
Depreciation	823			0
Total Tier Four	14,600			1,529

Note: $908,000 of support costs are distributed among the natural cost categories. Source of natural costs is the post-audit budget report.

Limits to Transferring Costs by Natural Classifications

Normally, when institutions charge indirect and support costs to cost centers, they do not distinguish among natural cost categories. Instead, the charges take the form of internal prices, chargebacks, and proratings, all of which embody combinations of personnel, consumables, and capital-cost elements. More often than not, these charges appear as consumables, unless they are clearly identified as a personnel or capital-cost charge. Lump-sum prorating tends to overload the consumables or a prorating line of the natural-cost structure.

Allocation procedures of the type illustrated in figures 5.3 and 5.4 will preserve the integrity of the natural-cost structure. Ratios of personnel compensation to consumables costs are useful indicators of financial stability over time. Each cost center has its unique personnel compensation and consumables ratio and tends to show a high degree of consistency over time.

Tracking natural costs over time is helpful in budgeting and long-range planning. In terms of who has cost control responsibilities, the department is normally considered to be the grassroots cost center. While the discussion so far has focused on from-the-top-down allocation of pooled costs, the department is actually the cost center from which aggregate institutional costs evolve: The institution's total cost is the sum of all departmental costs.

The Full Cost of Academic Divisions

Many, especially smaller institutions, may prefer to determine the costs of the types of academic divisions, which neither the budget nor the cost accounting system may identify specifically. The following list identifies several frequently mentioned cost centers:

- Natural and mathematical sciences
- Humanities
- Social sciences
- Education and physical education
- Special academic programs:
  - Required freshman courses
  - Junior-senior tutorials
- Upper- and lower-division programs
- Graduate studies

Even when college and university catalogs identify these types of entities, the accounting system will only recognize them specifically when someone has been given specific budget or cost control responsibility for them or when ad hoc cost studies are undertaken.

In practical terms, all of these academic cost centers are composites of departmental costs and, more precisely, composites of specific course offerings or activities for which students earn credits or some other recognition (i.e., audit, diploma, or other certification). It may be most practical to approach such costing by defining clearly the courses, course credits, or other certification evidence that circumscribe these types of programs, since departments often share courses, personnel, and facilities.

Allocating Costs to Administrative Departments

There is no fundamental difference in allocating pooled costs between academic and administrative departments. The key difference is that, at some point, some or all administrative and other support costs will be allocated to the primary programs. Thus, these costs will appear in an academic department's cost-center account.

If precision in costing is not an issue, lump sum prorating is very appropriate. Precision is enhanced when proratings are distributed among the affected departments, and it is lessened when they are accumulated in and charged as a large pooled cost. As was mentioned and illustrated earlier, for certain costing tasks that require a high degree of precision, cost prorating can be accomplished on the basis of broad natural-cost distinctions.

Departmental Budgets Are the Basis for Total Institutional Costs

The departmental budget is the foundation on which the entire institutional budget is built. If a department's costs reflect all appropriate support costs, as well as the costs engendered by the financing and using up of capital resources, the sum of departmental costs equals the institution's full costs. Therefore, this is an appropriate point in this discussion for turning to from-the-bottom-up costing, which follows in chapters 6 and 7.

Staff Benefits

Staff benefits are always a direct cost, specifically associated with a given employee and his or her employer. Yet, many institutions continue to pool staff benefits. Moreover, staff benefit pooling practices themselves differ among institutions.

These benefits fall into three broad categories: those that are part of the payroll system, those that may be accounted for separately (such as tuition, professional travel, and research support benefits), and those where the institution provides facilities and supplies without the need for reimbursement. The first two are accounted for easily, and no technical reasons prevent them from being charged directly to the employing department. The third is often ignored, but for costing purposes can be estimated.

Pooling of benefits is preferred for several reasons. It is argued that benefit pools facilitate the computation of benefit rates when budgets are prepared and for indirect-cost recovery. Sometimes pooling is preferred because a given benefit is managed by an executive other than the one whose budget would be affected by a direct charge. For instance, a provost or dean may wish to control the faculty professional travel benefit. In both instances, budget control should not be confused with accuracy in costing. When centrally controlled benefits are used up and the cost incurred, a charge against the user department clears the pooled budget while the user department is being charged the actual cost.

One point to remember is that each person entitled to a given staff benefit as well as the benefit proper can be identified precisely. Obstacles to charging staff benefits directly to user departments are institutional and not generic to staff benefit costs as such. If institutions are interested in full direct costing, they should develop a plan to allocate staff benefits directly to each department.

Unless the employee-specific information is made available to the cost analyst, pooled staff benefits will have to be allocated on some percentage basis to all academic departments. Thus, the cost will be spread to departments that may have no employees eligible for a particular benefit, such as the tuition benefit. Such cost averaging may be appropriate in some circumstances, but not when the objective is to determine precise departmental costs.

The tuition benefit may be a special case, and it takes two forms: a grant to the employee for tuition at another institution, normally paid directly to that institution, or a percentage discount (100 percent or less) for courses taken at the employing institution. In the first case, the institution actually spends money, whereas in the second it forgoes income. Institutions can treat internal tuition benefits as forgone income or a discount and get around the allocation issue while understating its costs. If a new definition of tuition discounts is implemented, it may address this issue directly.

Exercises

1. Using the FTFC model provided below, determine the full cost by tiers of one of your undergraduate academic divisions.

Worksheet 5.1: Your Institution's Full Costs for Undergraduate Academic Division X

Tiers	Cost Centers Natural Costs	Direct Costs	Indirect Costs	Total Costs	Allocation Base / Method
	Personnel				
	Salaries and Wages				
	Staff Benefits				
	Professional Services				
	Other				
	Subtotal				
	Consumables				
	Travel, Entertainment				
	Supplies, Classrooms				
	Supplies, Office				
	Supplies, Maintenance				
	Repair and Replacement				
	Printing				
	Computer Services				
	Printing				
	Utilities				
	Telephone				
	All Other				
	Subtotal				
	Adjustment for Duplication				
One	Total Tier One				
	Debt-Related Costs				
Two	Total Tier Two				
	Fully Expensed Short-Lived Assets				
Three	Total Tier Three				
	Depreciation or Facilities-Use Charge				
Four	Total Tier Four				

Please explain how you calculate the depreciation or facilities use charge:

2. Using the FTFC matrix provided below, determine the full cost by tiers of one of your undergraduate academic departments.

Worksheet 5.2: Your Institution's Full Costs for Undergraduate Academic Department X

Tiers	Cost Centers Natural Costs	Direct Costs	Indirect Costs	Total Costs	Allocation Base / Method
	Personnel				
	Salaries and Wages				
	Staff Benefits				
	Professional Services				
	Other				
	Subtotal				
	Consumables				
	Travel, Entertainment				
	Supplies, Classroom				
	Supplies, Office				
	Supplies, Maintenance				
	Repair and Replacement				
	Printing				
	Computer Services				
	Printing				
	Utilities				
	Telephone				
	All Other				
	Subtotal				
	Adjustment for Duplication				
One	Total Tier One				
	Debt-Related Costs				
Two	Total Tier Two				
	Fully-Expensed Short-Lived Assets				
Three	Total Tier Three				
	Depreciation or Facilities-Use Charge				
Four	Total Tier Four				

3. Please itemize, by department, for one academic division, the full cost by tiers, using the FTFC matrix provided below. Add columns as needed to encompass all departments in the division.

Worksheet 5.3: Your Institution's Full Costs for All Undergraduate Academic Departments in Division X

Tiers	Cost Centers Natural Costs	Dept. A	Dept. B	Dept. C	Dept. D	Dept. N	Total Division
	Personnel						
	Salaries and Wages						
	Staff Benefits						
	Professional Services						
	Other						
	Subtotal						
	Consumables						
	Travel, Entertainment						
	Supplies, Classroom						
	Supplies, Office						
	Supplies, Maintenance						
	Repair and Replacement						
	Printing						
	Computer Services						
	Printing						
	Utilities						
	Telephone						
	All Other						
	Subtotal						
	Adjustment for Duplication						
One	Total Tier One						
	Debt-Related Costs						
Two	Total Tier Two						
	Fully-Expensed Short-Lived Assets						
Three	Total Tier Three						
	Depreciation or Facilities-Use Charge						
Four	Total Tier Four						

Please explain your allocation bases and methods:

— 6 —

Academic Micro-Costing: The Full Cost of a Course

Chapter 6 concentrates on course costs and illustrates through the case of Liberal Arts College how net tuition and fees revenues can be apportioned to departments and courses.

Introduction

This chapter and the next describe procedures that produce full-cost information for specific educational and administrative activities. The intent is to highlight relatively simple approaches to direct full instructional costing, to illustrate how current revenues can be allocated to departments and courses, to define some recent innovations in activities and process costing, and to comment briefly and in general terms on a variety of administrative and operational costing tasks.

So far, costing has been described as an exercise in allocating several types of pooled direct and indirect costs to specified cost centers after the institution's official year-end audit has been completed. The preceding illustrations focused on the allocation of these cost pools to traditional administrative functions, to broad academic disciplines and professional schools, and to academic and administrative operating departments. The costing tasks that were described assumed that cost accounting policies were a given and that, after the audit work had been done, a variety of program costs would be computed. The examples highlighted the distribution among primary cost centers of traditional by-function support and identified three types of capital costs. This type of macro-costing is useful, especially when peer groups try to compare costs among their members.

The Meaning of Micro-Costing

From the institution's operating perspective, however, it is more practical to look at costing from the ground up by focusing on all the cost elements that must be assembled at the grassroots level if one is to end up with full-cost information for a particular cost center. Micro-costing accomplishes this type of costing objective.

The term "micro-costing," as used here, refers to the determination of the full costs of the many discrete academic and administrative activities and processes that epitomize an institution's daily work, including provisions for the current costs associated with the uses, financing, and consumption of physical capital resources. Micro-costing includes so-called activity-based costing and, depending upon the activity, process costing.

It is important to understand that full costing of activities and processes is not always necessary or appropriate. Often it is most practical to focus on direct costs only. Unfortunately, many institutions continue to pool—and therefore do not allocate directly—significant amounts of what by any definition clearly are direct costs. Therefore, an important first task for institutions is to maximize direct departmental costing. When institutions must know the long-term impact on their activities of capital investments and of support costs, full-activities costing is necessary. All cost analyses that relate in one way or another to the institution's future budgets and long-range plans must be cast in terms of total and marginal full costs.

Should institutions fully automate their costing process if they want to report activities costs? The answer is a qualified no. If they have not already done so, institutions should begin to develop specialized activities models that integrate key financial and nonfinancial data best suited to describe the activities whose costs are to be determined. Most of these models can be displayed in the spreadsheet mode and do not require complex mathematical formulations. The following examples use the spreadsheet format and, with few exceptions, contain all the information needed to compute the costs in question.

Even in full micro-costing, ways must be found to assign support and common cost pools to individual activities and processes. As will be shown, some of these allocations can be implemented more simply than others. For instance, it may be less complicated to allocate depreciation than admissions costs to a given instructional activity.

The normal source of financial information for activities costs is the departmental budget and sometimes special program budgets. The activities and processes whose costs must be determined are either subsets of these budgets or combinations of portions of two or more departmental budgets. This means that micro-costing tasks involve both the disassembling and the reassembling of departmental cost information. A large portion of the higher education costing literature is devoted to how this disaggregation and reassembling might take place and how institutions should or can determine the true full cost of their myriad activities. A large part of the original costing effort by the National Center for Higher Education Management Systems was devoted to this type of micro-costing, especially in the academic program area.[1]

In addition to budgetary data, micro-costing almost always requires specific nonfinancial information on enrollment, staff size, square footage, miles driven, kilowatt-hours consumed, and, when usage is the costing base, the number of transactions. A properly constructed costing model integrates this type of information with the appropriate financial data. In micro-costing, this figure is frequently a unit-cost measure that serves as a basis for charging and allocating specific costs through transfer pricing, chargebacks, or formula-based proratings.

Economists like to say that prices serve the purpose of clearing the shelves. In administrative micro-costing, the shelves are represented by individual budgets. Internal prices and charges clear these budgets by transferring costs to those who purchase administrative services or who must absorb a portion of various common costs. Internal price- or unit-cost-based allocation tends to be more direct and more precise than the types of broad, even crude, percentage-cost allocations of macro-costing.

Micro-Costing and the Cost Accounting System

Even in the post-SFAS No. 117 era, higher education accounting is not organized to answer questions concerning the full costs of teaching a conventional course, conducting a seminar, admitting a freshman class, or managing the institution's heating and cooling system.[2]

Most administrative micro-costing tasks are based on unique mini-cost-accounting systems created for each distinct costing task. Sometimes the normal accounting system is so far removed from what is needed that elaborate new stand-alone costing models must be constructed.

Types and Purposes of Micro-Costing

This chapter and the next are devoted to three broad types of micro-costing situations:

1. Academic-activities costing, principally including the costing of—
   - instructional activities and, if they can be measured, instructional outcomes,
   - individual research projects, and
   - academic degrees and other forms of certification.
2. Administrative-activities costing, including—
   - operational activities undertaken by administrative departments and
   - numerous specialized administrative processes involving sequential, repetitive, and often complex human and departmental interactions.
3. Unit full costs where the emphasis is on computing average and marginal costs of educational administrative services.

Activities and process costing are broadly defined here, and their cost models have two purposes: First, they are descriptive, telling administrators how much a given activity or process costs, and second, they can be prescriptive, suggesting how resources ought to be combined in the future for cost-effective results. Before one can make a judgment about the second purpose, one must understand the first.

The following discussion is essentially descriptive and assumes that institutions are by now familiar with the cost-crossover technology and software that is basic to most micro-costing. Here, the emphasis is not on the programming and numbering instructions, but rather on illustrations of the information, pricing, and cost allocation aspects for support activities and of physical capital resources costs. As in the preceding chapters, a key issue is how different combinations of allocation bases affect micro-cost-center costs.

The Four-Tier Full-Cost Model Applied to Course Costs

Responsibility or cost center full costing means that at some point the sum of activities and process costs will reflect the institution's annual support and capital costs. The individual course is the quintessential collegiate activity whose full costs can be determined quite precisely with the appropriate underlying information.

In general, the following must be identified:

- The course's direct costs
- The indirect and support costs which the course must support
- The costs represented by the capital resources which the course uses or consumes
- The net student and other budgeted revenues generated by each course's enrollment

Two costing and revenue-allocation approaches must be considered. The first derives from the discussion in chapters 3 to 5 and requires that full departmental costs, for instance, for Research University's chemistry department, be distributed on the basis of some sort of allocation procedure among the courses currently offered by the department.

The second approach, used here, illustrates a course-centered cost- and revenue-allocation system that focuses on affinity-based transfer prices for allocating support and capital costs. Prominent among these are standard cost measures per student credit hour, per square feet of assigned space, or for personnel compensation.

Course Cost Information at Liberal Arts College

Liberal Arts College is a hypothetical four-year undergraduate liberal arts institution. The data for the college are a composite of data drawn from several actual colleges with similar academic offerings and enrollment.

Over the years, since the inception of program costing inspired by the National Center for Higher Education Management Systems and NACUBO, Liberal Arts College has gradually evolved an accounting system and costing models that allow it to track each employee's contribution to personnel compensation costs and each student's course load and net revenue contribution on the basis of the following types of modules for cost accounting management information systems:

1. A personnel (faculty and staff) compensation cost module identifies, employee by employee, total personnel compensation costs that will be assigned to each individual course or certification unit (see figure 6.4). This module's data will be crossed over to the course-load matrix.
2. The course-load matrix tracks, course by course, the credits generated by each student during each academic term. This module's companion is the net-revenue

module. When this module is crossed over to the personnel compensation cost module and other cost modules, it is called a course-cost-load matrix.

3. The net student revenue module identifies precisely, student by student, how much direct net tuition and fees income is generated by each course or certification unit. A certification unit or cost objective is defined as any institutional entity or budget that reflects costs engendered in order to produce a credit hour, a diploma, or certificate or some other measure of student achievement.

Each module contains the requisite supplementary data elements that permit the complete assignment of direct, indirect, and support costs to individual academic courses and course-like activities. Together, these modules for cost accounting management information systems constitute a multidimensional student-based course cost-and-revenue matrix, which computes the full cost of and identifies the net tuition and fee revenues available to every course offered during a given business year.

Variations of these three modules are in wide use today, but the degree of refinement, sophistication, and depth of the underlying databases differ. Normally, course costs are reported on the basis of direct departmental costs, and neither support costs nor capital costs are allocated to courses. In addition, the module 3 information is not always configured as precisely as will be illustrated in this Liberal Arts College application.

Ideally, and under SFAS No. 117, it can be argued that total instructional costs are the sum of full course costs plus the full costs of all other academic activities within the purview of the instructional account. Among others, this would include the full cost of departmental research. This means that course and activity costs will reflect all direct and indirect costs, including all support and capital costs that were formerly reported separately.

Other information essential for the full costing of instructional activities includes—

- consumables budgets that serve as a basis for allocating direct nonpersonnel operating costs and
- formulas for allocating support and capital costs directly to instructional activities.

The Full Costs of Economics 101-1

The following examples describe procedures for computing the full costs of Economics 101-1 at Liberal Arts College. Figure 6.1 illustrates the college's by-function post-audit financial condition and fully integrated chart of accounts in the four-tier full-cost (FTFC) format. The vertical display identifies the college's primary and support functions. The horizontal display, also used in subsequent exhibits, calls attention to three levels of cost aggregation: the college as a whole, an individual department (economics), and a single course section (Economics 101-1).

Where normally a college would identify departmental budgets, the simplified course cost-and-revenue matrix (figure 6.2) arrays, horizontally under instruction, every course from 1 through *n*. A more complex matrix would include the costs of all departmental research projects and any other distinct activities within the department that must be charged to instruction.

Figure 6.1: Costs by Function for Liberal Arts College Using the FTFC Model

Cost Centers	Total College	Department of Economics	Economics 101-1
Direct			
Instruction	$23,882	?	?
Research	1,008	?	?
All Other	293	?	?
Total E&G	25,183	?	?
Auxiliary Enterprises	14,510	?	?
All Other	357	?	?
Subtotal	40,050	?	?
Indirect			
Academic Support	615	?	?
Libraries	2,099	?	?
Academic Computer Services	1,015	?	?
Executive Administration	1,179	?	?
General Institutional	2,396	?	?
Student Services	3,876	?	?
Public Relations and Development	1,806	?	?
O&M	4,605	?	?
Subtotal	17,591	?	?
Total Tier One	57,641	?	?
Long-Term Debt Costs	695	?	?
Total Tier Two	58,336	?	?
One-Year Assets	413	?	?
Total Tier Three	58,749	?	?
Depreciation	2,870	?	?
Total Tier Four	61,619	?	?

Figure 6.2: Simplified Course Cost-and-Revenue Matrix Where Total Instructional Costs Equal Sum of Course Costs

Cost Tiers	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course N	Instr. Sum (1-N)
Personnel								
Consumables								
Tier One								
Long-Term Debt Costs								
Total Tier Two								
One-Year Assets								
Total Tier Three								
Depreciation								
Total Tier Four								
Net Tuition Revenue								
Other Revenue								
Total Revenues								
Surplus/Deficit								

Figure 6.3 arranges functional cost information of figure 6.1 on the basis of natural costs. For certain presentations, a direct and an indirect cost column should be added for each function (figure 6.1) and course (figure 6.2). Similar layouts can be constructed for the other primary and support functions and their underlying activities.

Figure 6.3: Natural Costs for Liberal Arts College Using the FTFC Model ($ in 1,000s)

Cost Centers	Total College	Instruction	Department of Economics	Economics 101-1
Personnel Compensation				
Salaries, Faculty	$12,755	?	?	?
All Other Salaries and Wages	10,001	?	?	?
Student Wages	1,751	?	?	?
Subtotal	24,507	?	?	?
Staff Benefits	8,769	?	?	?
Tuition Benefit	1,160	?	?	?
Room and Board, Etc.	735	?	?	?
Total Benefits	10,664	?	?	?
Professional Services	1,585	?	?	?
Total Compensation	36,756	?	?	?
Consumables				
Travel, Entertainment	1,495	?	?	?
Supplies	1,655	?	?	?
Telecommunications	1,102	?	?	?
Computer Services	756	?	?	?
Printing, Publications	1,050	?	?	?
Property/Casualty Insurance	865	?	?	?
Dues, Subscriptions	317	?	?	?
Postage, Freight	709	?	?	?
Repair, Replacement, Contr.	4,464	?	?	?
Utilities Purchased	1,092	?	?	?
Food, Students	1,929	?	?	?
Food, Other	555	?	?	?
Goods for Resale	3,065	?	?	?
Miscellaneous	1,831	?	?	?
Subtotal	20,885	?	?	?
Total Tier One	57,641	?	?	?
Long-Term Debt Costs	695	?	?	?
Total Tier Two	58,336	?	?	?
One-Year Assets	413	?	?	?
Total Tier Three	58,749	?	?	?
Depreciation	2,870	?	?	?
Total Tier Four	61,619	?	?	?

In macro-costing (from-the-top-down costing), these three matrices (figures 6.1 to 6.3) fill in from left to right. In micro-costing (from-the-bottom-up costing), personnel, consumables, support, and capital costs are allocated first to courses and activities, then from right to left to departments and, eventually, instruction.

The Basic Data Modules

The Personnel Work-Load Compensation Module

Figure 6.4 is a spreadsheet that provides the personnel compensation details, distinguishing between salaries and wages on the one hand and staff benefits on the other. Total compensation for the Department of Economics is $821,569—salaries and wages amount to $604,827, and benefits total $216,742. The spreadsheet contains basic workload indicators and other important data elements.

The exhibit arranges faculty by rank and includes several, but not necessarily all, useful indicators that normally are part of a personnel classification. The work-load factor is the divisor by which an individual faculty member's total compensation cost will be allocated to courses and other work assignments.

Departmental Personnel Compensation Costs: Department of Economics

Figure 6.5 displays the direct personnel compensation costs left blank in the last two columns of figure 6.3, choosing for the latter one-sixth of the direct compensation cost ($12,561) for the Economics 101-1 professor (figure 6.4). The course has an enrollment of 48 students for 144 credit hours.

The faculty work-load factor dissects each faculty member's total compensation and assigns it to each work-load segment (for instance, Economics 101-1).

Faculty Course-Load Module

Figure 6.6 describes how the department chair's compensation can be allocated. A portion of the cost is for her administrative work and is distributed to all departmental activities. Liberal Arts College allows a fourth of the compensation for this duty per semester; other institutions might allow less or have a different overall work load. For instance, *Alternate Allocation* assumes a 10 percent administrative work load, thus increasing the direct course costs. Because the illustration is for one semester, only half of the total compensation is distributed here.

When research or other duties are part of the work load, compensation-cost shares will be assigned proportionately.

The Student Course-Load Module

The student course-load module tracks each student's course or certification unit load and enables administrators to construct a variety of course credit-cost classifications: by departments, by major and nonmajor courses, by core and noncore groupings, by lower- and upper-division status, by different groupings of graduate credits.

Figure 6.7 illustrates a typical student's semester course load, identifying course numbers, instructor codes, credits earned, faculty compensation assigned, and other essential cost-crossover information. The instructor code locates the appropriate compensation cost and the room code accesses a variety of cost allocation bases.

Figure 6.4: Spreadsheet for Liberal Arts College's Personnel Work-Load Compensation Module

Personnel Department of Economics	Rank	Hire	Years	Tenure Status	Leave Status	Work-Load Factor	Annual Salary or Wages	FICA (0.0765)	Pension Plan (0.1200)	Medical Plan	Life Insur. (0.0095)	Workers Comp. (0.01299)	Unemploy.
Faculty													
Economics 101-1 Professor	1	1964	31	T		3	$59,900	$4,582	$7,188	$884	$569	$773	$0
Faculty 2	1	1961	34	T	1 Yr.	4 (1 unit chair)	64,500	4,934	7,740	884	613	832	0
Faculty 3	1	1971	24	T	1 Qtr.	3	72,600	5,554	8,712	884	690	937	0
Faculty 4	1	1968	27	T		3	64,750	4,953	7,770	884	615	835	0
Subtotal							261,750	20,024	31,410	3,536	2,487	3,377	0
Percentage							1%	0%	0%	0%	0%	0%	0%
Faculty 5	2	1975	20	T		3	$45,000	$3,443	$5,440	$884	$428	$581	$0
Faculty 6	2	1976	19	T		3	45,500	3,485	5,466	884	433	588	0
Subtotal							90,550	6,927	10,866	1,768	860	1,168	0
Percentage							1%	0%	0%	0%	0%	0%	0%
Faculty 7	3	1993	2	NT		4	$34,757	$2,659	$4,171	$884	$330	$448	$0
Faculty 8	3	1988	7	NT		4	37,000	2,831	4,440	884	352	477	0
Faculty 9	3	1989	6	NT		3	34,500	2,639	4,140	884	328	445	0
Faculty 10	3	1987	8	NT	1 Qtr.	4	38,525	2,947	4,623	884	366	497	0
Subtotal							144,782	11,076	17,374	3,536	1,375	1,868	0
Percentage							78.33%	5.99%	9.40%	1.91%	0.74%	1.01%	0.00%
Faculty Total							$497,082	$38,027	$59,650	$8,840	$4,722	$6,412	$0
Percentage							74.62%	5.71%	8.95%	1.33%	0.71%	0.96%	0.00%
Professionals													
Professional 1	1	1994	1	Visit.		2	$12,500	$956	$1,500	$884	$0	$161	$0
Professional 2	3	1992	3	Visit.		3	23,850	1,825	2,862	0	0	308	0
Subtotal							36,350	2,781	4,362	884	0	469	0
Percentage							77.36%	5.92%	9.28%	1.88%	0.00%	1.00%	0.00%
Clerical													
Clerical 1		1968	27				$32,550	$2,490	$3,906	$884	$309	$420	$0
Clerical 2		1981	14				25,845	1,977	3,101	884	246	333	0
Clerical 3		1994											3,500
Subtotal							58,395	4,467	7,007	1,768	555	753	3,500
Percentage							63.62%	4.87%	7.63%	1.93%	0.60%	0.82%	3.81%
Clerical 4		1992	3				$7,500	$574	$0	$0	$0	$97	$0
Clerical 5		1993	2				5,500	421	0	0	0	71	0
Subtotal							13,000	995	0	0	0	168	0
Percentage							78.30%	5.99%	0.00%	0.00%	0.00%	1.01%	0.00%
Total Personnel							$604,827	$46,269	$71,019	$11,492	$5,277	$7,802	$3,500
Percentage							73.62%	5.63%	8.64%	1.40%	0.64%	0.95%	0.43%

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Figure 6.4 (continued): Spreadsheet for Liberal Arts College's Personnel Work-Load Compensation Model

Personnel Department of Economics	Long-Term Disab. (0.0041)	Tuition Benefit	Prof. Travel	Over-Time	Sub-total	Sick Pay Wages	Holiday Pay Wages	Sub-total	Benefits Total	Group	Total Comp.	Group	Total All Groups
Faculty													
Economics 101-1 Professor	$246	$0	$1,228	$0	$15,470	$0	$0	$0	$15,470	17.99%	$75,370	21.67%	9.17%
Faculty 2	264	0	1,385	0	16,653	0	0	0	16,653	19.37	81,153	23.34	9.88
Faculty 3	298	0	675	0	17,749	0	0	0	17,749	20.64	90,349	25.98	11.00
Faculty 4	265	19,555	1,229	0	36,107	0	0	0	36,107	42.00	100,857	29.00	12.28
Subtotal	1,073	19,555	4,517	0	85,978	0	0	0	85,978	100.00	347,728	100.00	42.32
Percentage	0.31%	5.62%	1.30%	0.00%	24.73%	0.00%	0.00%	0.00%	24.73%		100.00%		
Faculty 5	$185	$0	$758	$0	$11,677	$0	$0	$0	$11,677	27.12	$56,677	42.42	6.90
Faculty 6	187	19,555	787	0	31,384	0	0	0	31,384	72.88	76,934	57.58	9.36
Subtotal	371	19,555	1,545	0	43,061	0	0	0	43,061	100.00	133,611	100.00	16.26
Percentage	0.28%	14.64%	1.16%	0.00%	32.23%	0.00%	0.00%	0.00%	32.23%		100.00%		
Faculty 7	$143	$0	$723	$0	$9,358	$0	$0	$0	$9,358	23.35	$44,115	23.86	5.37
Faculty 8	152	0	789	0	9,924	0	0	0	9,924	24.77	46,924	25.38	5.71
Faculty 9	141	0	1,511	0	10,089	0	0	0	10,089	25.18	44,589	24.12	5.43
Faculty 10	158	0	1,226	0	10,701	0	0	0	10,701	26.70	49,226	26.63	5.99
Subtotal	594	0	4,249	0	40,071	0	0	0	40,071	100.00	184,853	100.00	22.50
Percentage	0.32%	0.00%	2.30%	0.00%	21.68%	0.00%	0.00%	0.00%	21.68%		100.01%		
Faculty Total	$2,038	$39,110	$10,311	$0	$169,110	$0	$0	$0	$169,110		$666,192		81.09
Percentage	0.31%	5.87%	1.55%	0.00%	25.38%	0.00%	0.00%	0.00%	25.38%	0.00	100.00%		
Professionals													
Professional 1	$0	$0	$925	$0	$4,427	$0	$0	$ 0	$4,427	41.60	$16,927	36.02	2.06
Professional 2	0	0	1,220	0	6,214	0	0	0	6,214	58.40	30,064	63.98	3.66
Subtotal	0	0	2,145	0	10,641	0	0	0	10,641	100.00	46,991	100.00	5.72
Percentage	0.00%	0.00%	4.56%	0.00%	22.64%	0.00%	0.00%	0.00%	22.64%		100.00%		
Clerical													
Clerical 1	$133	$6,518	$1,220	$579	$16,460	$355	$290	$645	$17,105	51.23	$49,655	54.10	6.04
Clerical 2	106	2,444	1,220	1,223	11,534	855	395	1,250	12,784	38.29	38,629	42.09	4.70
Clerical 3	0	0	0	0	3,500	0	0	0	3,500	10.48	3,500	3.81	0.43
Subtotal	239	8,962	2,440	1,802	31,494	1,210	685	1,895	33,389	100.00	91,784	100.00	11.17
Percentage	0.26%	9.76%	2.66%	1.96%	34.31%	1.32%	0.75%	2.06%	36.38%		100.00%		
Clerical 4	$0	$0	$1,220	$0	$1,891	$0	$0	$0	$1,891	52.48	$9,391	56.56	1.14
Clerical 5	0	0	1,220	0	1,712	0	0	0	1,712	47.52	7,212	43.44	0.88
Subtotal	0	0	2,440	0	3,602	0	0	0	3,603	100.00	16,603	100.00	2.02
Percentage	0.00%	0.00%	14.70%	0.00%	21.70%	0.00%	0.00%	0.00%	21.70%		100.00%		
Total Personnel	$2,277	$48,072	$17,336	$1,802	$214,847	$1,210	$685	$1,895	$216,742		$821,569		100.00
Percentage	0.28%	5.85%	2.11%	0.22%	26.15%	0.15%	0.08%	0.23%	26.38%		100.00%		

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Figure 6.5: Liberal Arts College's Compensation Costs for Economics 101-1 and the Department of Economics Using the FTFC Model

Cost Centers	Total College ($ in 1,000s)	Instruction ($ in 1,000s)	Department of Economics Direct	Economics 101-1 Direct
Personnel Compensation				
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983
Salaries, Officers	1,906	395	0	0
All Other Salaries and Wages	8,095	1,334	58,395	0
Student Wages	1,751	253	13,000	0
Subtotal	24,507	13,546	568,477	9,983
Staff Benefits	8,769	5,283	164,973	2,578
Tuition Benefit	1,160	518	48,072	0
Room and Board, Etc.	735	116	3,697	0
Total Benefits	10,664	5,917	216,742	2,578
Professional Services	1,585	834	36,350	0
Total Compensation	36,756	20,297	821,569	12,561

Figure 6.6: Faculty Course-Load Module for One Semester at Liberal Arts College, Apportioning Total Compensation Costs from Figure 6.1.

Department Chair Work Assignment	To Be Allocated Annually $81,153	Alternate Allocation $81,153
Department Chair	$10,144	$4,058
Economics 101-3	10,144	12,173
Economics 244	10,144	12,173
Interdepartmental 100	10,144	12,173
Semester Total	40,576	40,577

Note: Column B equals $81,153 ÷ 2 ÷ 4
Column C ($4,058) equals 1/10 of $81,153
Rest of Column C equals $81,153 - 4,058 ÷ 2 ÷ 3

Figure 6.7: Sample One, Semester Course-Load Module for a Typical Junior at Liberal Arts College

A Typical Junior, First Semester Courses	Department	Instructor Code	Credits	Staff Compensation	Room Code
201-3	English	EG 522	3	$8,194	122-10
334	Psychology	PSY 321	3	10,732	122-25
334L	Psychology	PSY 321	1	3,577	122-30
338	Art History	AH 112	2	5,821	114-15
356 Tutorial	Psychology	PSY 101	3	11,224	122-31
Total			12	39,549	

Note: (Compensation ÷ 2) ÷ Total Teaching Load) x Course Credits

The Student Net Revenue Module

This module is based on the understanding that individual revenue contributions for groups of students will differ because (1) some students receive student aid grants and others do not, (2) the individual net revenue contributions differ widely among those receiving student aid grants, and (3) course loads differ among students. Figure 6.8 illustrates the underlying information for a typical junior, taken from his billing file.

Figure 6.8: Annual Net Revenue Contribution of a Typical Junior at Liberal Arts College

Items	Revenues	Share of Invoice	Student Aid Grant Portions	Net Revenues
Typical Junior				
Tuition and Fees	$19,555	76.54%	$6,506	$13,049
Laboratory Fees	385	1.51	128	257
Room and Board	5,450	21.33	1,813	3,637
Supplies Provided	158	0.62	53	105
Total Charges	25,548	100.00	8,500	17,048
Student Aid Grant	8,500	33.27		
Net Invoice	17,048			
Guaranteed Loan	4,500	17.61		
Institutional Loan	1,250	4.89		
Required Payment	17,048			
Paid Last Term	5,649			
Due Now	5,649			

Note: For internal financial planning and reporting, Liberal Arts College allocates student aid grants in proportion to the fee structure of the gross invoice.

The typical junior falls into the 30–39 percent decile discount bracket for student aid grants. Her total current net contribution to revenues will be $17,048 ($6,750 paid from loan funds) rather than the $25,548 she would have to pay without student aid grants.

How much of the net invoice should be allocated to instruction? The student aid grants portions are for the four basic charges listed in the invoice. Liberal Arts College allocates all but the net invoice for room and board to instruction, or $13,411 ($17,048 minus $3,637). This is contrary to general current practice where no discounts for student aid grants are applied to auxiliary enterprises. In contrast to the traditional method, the college's practice increases the current-net-revenue allocation to instruction and reduces the net amount going to auxiliary enterprises. The overall institutional operating result is not affected. Figure 6.9 illustrates how the $13,411 net revenues are assigned to the typical junior's courses. All net tuition and fees revenues can be allocated in this manner, first directly to individual courses and, through them, to the various departments.

A useful analysis of net student revenues is to rank them by the size of the student aid grants discount. The underlying information layout is shown in figure 6.10.

The student billing file can be ranked, student by student, by the discount percentage (student aid grant as a percentage of total invoice). Figure 6.10 shows a sample bracket of eight students where the case student occupies the 33.27 percentile rank.

Figures 6.11 and 6.12 summarize Liberal Arts College's overall discount structure, grouping the individual student invoices by decile discount cohorts. Figure 6.11 calculates the budgetable net revenues produced by each cohort and shows the cohort revenue assignments to instruction (column O). Figure 6.12 shows the by-cohort budgetable revenue assignments to the Department of Economics and to a single course, Economics 101-1.

In figures 6.11 and 6.12 revenue assignments are made on the basis of the course credits

Figure 6.9: Student Revenues at Liberal Arts College Allocated to the Course-Load Matrix

A Typical Junior, First Semester Courses	Department	Instructor Code	Credits	Net Invoice	Room Code
Net Invoice to Institution				$13,411	
201-3	English	EG 522	3	1,490	122-10
334	Psychology	PSY 321	3	1,490	122-25
334L	Psychology	PSY 321	1	497	122-30
338	Art History	AH 112	2	993	114-15
356 Tutorial	Psychology	PSY 101	3	1,490	122-31
Total Semester I			12	5,960	
202-3	English	RG 522	3	1,490	122-10
335	Psychology	PSY 321	3	1,490	122-25
335L	Psychology	PSY 321	1	497	122-30
324	French	FR 85	2	993	118-05
357 Tutorial	Psychology	PSY 101	3	1,490	122-31
202	Political Science	PSC 213	3	1,490	118-16
Total Semester II			15	7,451	
Total			27	13,411	

Note: Figure 6.8 allocates $13,411 to instruction and $3,637 to auxiliary enterprises.

Figure 6.10: Student Aid Grant Discount Ranking at Liberal Arts College

Percentile Bracket	Name	Invoice	Student Aid Grant	Net	Auxiliary Enterprises	Instruction
30-39%						
38.75	Student A					
37.21	Student B					
36.01	Student C					
35.22	Student E					
33.27	Junior A	$25,548	$8,500	$17,048	$3,637	$13,411
32.18	Student G					
31.05	Student H					
30.28	Student I					

Figure 6.11: Decile Distribution of Student Aid Discounts and Budgetable Revenues from Student Charges at Liberal Arts College, Showing the Calculation of Budgetable Net Revenues Assigned to Instruction (Column O)

Percentile Ranks Total Discounts (A)	Number of Students (B)	% of Students (C)	Total Invoice Average (D)	Avg. Student Aid Grant for Each Cohort (E)	Avg. % Discount Bracket (F)	Avg. Revenues Before Restricted Student Aid Grant Revenue (G)	Total Gross Revenues Before Student Aid Grant Discounts (H)	Total Student Aid Grant Discounts (I)
Data Sources		% of B Total	Billing File	Billing File	E as % of D	D - E	B x G	B x E
100+	11	0.50%	$25,578	$28,714	112.26%	-$3,136	$281,358	$315,852
90 to 99	12	0.54	25,256	24,806	98.22	450	303,072	297,677
80 to 89	26	1.18	25,364	22,120	87.21	3,244	659,464	575,119
70 to 79	35	1.59	25,278	19,674	77.83	5,604	884,730	688,585
60 to 69	87	3.95	25,238	16,788	66.52	8,450	2,195,706	1,460,584
50 to 59	113	5.13	25,185	13,645	54.18	11,540	2,845,905	1,541,911
40 to 49	105	4.77	19,985	9,697	48.52	10,288	2,098,425	1,018,156
30 to 39	113	5.13	20,086	7,817	38.92	12,269	2,269,718	883,374
20 to 29	214	9.72	21,598	5,993	27.75	15,605	4,621,972	1,282,603
10 to 19	278	12.62	25,614	4,231	16.52	21,383	7,120,692	1,176,338
1 to 9	312	14.17	22,356	1,911	8.55	20,445	6,975,072	596,369
Total with Discounts	1,306	59.31	23,168	7,532	32.51	15,635	30,256,114	9,836,569
No Discounts	896	40.69	22,558	0	0.00	22,558	20,211,968	0
Total	2,202	100.00	22,918	4,467	19.49	18,452	50,468,082	9,836,569
Weighted Averages	With Student Aid Grants		23,168	7,532	32.51	15,635	30,256,114	9,836,569
or Totals per Column	Without		22,558	0	0.00	22,558	20,211,968	0
	Total		22,918	4,467	19.49	18,452	50,468,082	9,836,569

Note: This illustration uses average percentage decile cohort percentage shares for allocating revenues to auxiliary enterprises and instruction. Since all student invoices are first ranked individually, the auxiliary enterprises allocation can be accomplished student by student. Liberal Arts College charges a comprehensive fee of $25,548. Column D shows the average invoice for each cohort. The average discount for students with discounts is 32.51 percent. The average discount for all students is 19.49 percent. Column M shows the percentage allocation of budgetable revenues (column L) to auxiliary enterprises. Column O shows the budgetable revenue allocation to instruction. The institution produced 50,670 credit hours for the year in question (column P). Column Q lists the average credit hours per semester for each cohort. Because of rounding, figures may not add up exactly to totals.

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Figure 6.11 (continued): Decile Distribution of Student Aid Discounts and Budgetable Revenues from Student Charges at Liberal Arts College, Showing the Calculation of Budgetable Net Revenues Assigned to Instruction (Column O)

Percentile Ranks Total Discounts (A)	Total Budgetable Revenues before Restricted Student Aid Grants (J)	Total Restricted Student Aid Grant Revenues (K)	Total Budgetable Revenues (L)	Percent of Revenues Assigned to Auxiliary Enterprises (M)	Total Revenues Assigned to Auxiliary Enterprises (N)	Total Revenues Assigned to Instruction (O)	Total Annual Credits (P)	Average Semester Credit Load (Q)
Data Sources		Invoices	J + K	Invoices	K x M	L - N	Course-Load Matix	(P + B) + 2
100+	-$34,494	$413,655	$379,161	23.46%	$88,951	$290,210	330	15.000
90 to 99	5,395	328,920	334,315	23.46	78,430	255,885	396	16.500
80 to 89	84,345	332,850	417,195	21.52	89,780	327,415	845	16.250
70 to 79	196,145	365,225	561,370	19.75	110,871	450,499	1,225	17.500
60 to 69	735,122	388,925	1,124,047	18.52	208,174	915,873	3,045	17.500
50 to 59	1,303,994	368,285	1,672,279	19.23	321,579	1,350,700	2,825	12.500
40 to 49	1,080,269	358,550	1,438,819	20.25	291,361	1,147,458	2,562	12.200
30 to 39	1,386,344	345,225	1,731,569	18.37	318,089	1,413,480	2,791	12.350
20 to 29	3,339,369	202,505	3,541,874	17.22	609,911	2,931,963	7,276	17.000
10 to 19	5,944,354	101,225	6,045,579	18.52	1,119,641	4,925,938	7,395	13.300
1 to 9	6,378,703	98,520	6,477,223	15.33	992,958	5,484,265	8,580	13.750
Total with Discounts	20,419,545	3,303,885	23,723,430	17.83	4,229,745	19,493,686	37,270	14.269
No Discounts	20,211,968	509,155	20,721,123	20.22	4,189,811	16,531,312	22,400	12.500
Total	40,631,513	3,813,040	44,444,554	18.94	8,419,557	36,024,997	59,670	13.549
Weighted Averages	20,419,545	3,303,885	23,723,430	20.14	4,229,745	19,493,686	37,270	14.269
or Totals per Column	20,211,968	509,155	20,721,123	20.22	4,189,811	16,531,312	22,400	12.500
	40,631,513	3,813,040	44,444,554	20.52	8,419,557	36,024,997	59,670	13.549

Note: Because of rounding, figures may not add up exactly to totals.

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Figure 6.12: Decile Distribution of Student Aid Discounts and Budgetable Revenues from Student Charges at Liberal Arts College, Showing Budgetable Net Revenues Assigned to the Department of Economics and Economics 101-1 (Columns J and L)

Percentile Ranks Total Discounts (A)	Number of Students (B)	% of Students (C)	Total Budgetable Revenues (D)	% Revenues Assigned to Auxiliary Enterprises (E)	Total Revenues to Auxiliary Enterprises (F)	Total Revenues to Instruction (G)	Total Annual Credit Hours (H)	Annual Credits in Economics Department (I)	Total Revenues Assigned to Economics Department (J)	Annual Credits in Economics 101-1 (K)	Revenues Assigned to Economics 101-1 (L)
Data Sources	Billing File	% of B Total	Column L Fig. 6.11		D x E	D - F	Course-Load Matrix	Course-Load Matrix	(G + H) x I	Figure 6.13	(G + H) x K
100+	11	0.50%	$379,161	23.46%	$88,951	$290,210	330	15	$13,191	0	0
90 to 99	12	0.54	334,315	23.46	78,430	255,885	396	21	13,570	3	1,939
80 to 89	26	1.18	417,195	21.52	89,780	327,415	845	35	13,562	3	1,162
70 to 79	35	1.59	561,370	19.75	110,871	450,499	1,225	42	15,446	0	0
60 to 69	87	3.95	1,124,047	18.52	208,174	915,873	3,045	36	10,828	3	902
50 to 59	113	5.13	1,672,279	19.23	321,579	1,350,700	2,825	36	17,212	12	5,737
40 to 49	105	4.77	1,438,819	20.25	291,361	1,147,458	2,562	135	60,463	15	6,718
30 to 39	113	5.13	1,731,569	18.37	318,089	1,413,480	2,791	141	71,408	18	9,116
20 to 29	214	9.72	3,541,874	17.22	609,911	2,931,963	7,276	210	84,622	12	4,836
10 to 19	278	12.62	6,045,579	18.52	1,119,641	4,925,938	7,395	306	203,832	6	3,997
1 to 9	312	14.17	6,477,223	15.33	992,958	5,484,265	8,580	282	180,252	9	5,753
Total I&E Discounts	1,306	59.31	23,723,431	17.83	4,229,745	19,493,686	37,270	1,259	684,387	81	40,160
No Discounts	896	40.69	20,721,123	20.22	4,189,811	16,531,312	22,400	871	642,802	63	46,494
Total	2,202	100.00	44,444,554	18.94	8,419,557	36,024,997	59,670	2,130	1,327,189	144	86,654

Note: This illustration uses average percentage decile cohort percentage shares for allocating revenues to the Department of Economics and to Economics 101-1. Since all student invoices are first ranked individually, these allocations can be accomplished student by student. Although this exhibit is calculated from left to right, in from-the-bottom-up micro-costing column is actually the sum of all individual course-budgetable revenue accounts (see column L).

Figure 6.13: Liberal Arts College Department of Economics Course-Revenue Matrix With Credit-Hour Revenues

Percentile Rank Total Discounts (A)	Number of Students (B)	Total Credit Hours (C)	Economics 101-1 Credits (D)	Economics 101-2 Credits (E)	Economics 102-1 Credits (F)	Economics 102-2 Credits (G)	Economics 220 Credits (H)	Economics 223 Credits (I)	Economics 235 Credits (J)	Economics 351 Credits (K)	Economics 300 Credits (L)	Economics 400 Credits (M)	Economics All Other (N)	Total Department of Economics Credits (O)
Data Sources	Billing File	Course-Load Matrix												
100+	11	330	0	0	3	3	0	3	0	0	3	0	3	15
90 to 99	12	396	3	0	0	0	0	3	3	0	0	3	9	21
80 to 89	26	845	3	0	6	3	6	3	0	0	3	3	8	35
70 to 79	35	1,225	0	0	0	0	0	3	6	3	6	9	15	42
60 to 69	87	3,045	3	0	6	3	0	0	0	0	6	3	15	36
50 to 59	113	2,825	12	6	6	3	3	0	0	0	3	0	3	36
40 to 49	105	2,562	15	12	9	6	3	6	9	12	9	9	45	135
30 to 39	113	2,791	18	15	15	12	6	3	9	6	15	6	36	141
20 to 29	214	7,276	12	12	15	12	3	6	12	9	21	15	93	210
10 to 19	278	7,395	6	9	12	12	15	9	18	15	18	21	171	306
1 to 9	312	8,580	9	12	15	9	21	6	12	15	12	15	156	282
Total I&E Discounts	1,306	37,270	81	66	87	63	57	42	69	60	96	84	554	1,259
No Discounts	896	22,400	63	54	51	48	27	35	36	24	33	36	464	871
Total	2,202	59,670	144	120	138	111	84	77	105	84	129	120	1,018	2,130
	Revenues Assigned to Instruction	Total Instruction Credit Hours	Revenues Assigned to Each Course											
100+	$290,210	330	$0	$0	$2,638	$2,638	$0	$2,638	$0	$0	$2,638	$0	$2,638	$13,191
90 to 99	255,885	396	1,939	0	0	0	0	1,939	1,939	0	0	1,939	5,816	13,570
80 to 89	327,415	845	1,162	0	2,325	1,162	2,325	1,162	0	0	1,162	1,162	3,100	13,562
70 to 79	450,499	1,225	0	0	0	0	0	1,103	2,207	1,103	2,207	3,310	5,516	15,446
60 to 69	915,873	3,045	902	0	1,805	902	0	0	0	0	1,805	902	4,512	10,828
50 to 59	1,350,700	2,825	5,737	2,869	2,869	1,434	1,434	0	0	0	1,434	0	1,434	17,212
40 to 49	1,147,458	2,562	6,718	5,375	4,031	2,687	1,344	2,687	4,031	5,375	4,031	4,031	20,154	60,463
30 to 39	1,413,480	2,791	9,116	7,597	7,597	6,077	3,039	1,519	4,558	3,039	7,597	3,039	18,232	71,408
20 to 29	2,931,963	7,276	4,836	4,836	6,044	4,836	1,209	2,418	4,836	3,627	8,462	6,044	37,476	84,622
10 to 19	4,925,938	7,395	3,997	5,995	7,993	7,993	9,992	5,995	11,990	9,992	11,990	13,988	113,906	203,832
1 to 9	5,484,265	8,580	5,753	7,670	9,588	5,753	13,423	3,835	7,670	9,588	7,670	9,588	99,714	180,252
Total I&E Discounts	19,493,686	37,270	40,160	34,341	44,890	33,484	32,765	23,297	37,230	32,723	48,996	44,003	312,498	684,387
No Discounts	16,531,312	22,400	46,494	39,852	37,638	35,424	19,928	25,830	26,568	17,712	24,354	26,568	342,434	642,802
Total	36,024,997	59,670	86,654	74,193	82,528	68,908	52,691	49,127	63,798	50,435	73,351	70,572	654,932	1,327,189

Note: When the course-load matrix is combined with the ranked student billing file, instructional revenues can be assigned directly to each course.

Selected Allocation Bases

The table below lists several indirect- and support-cost allocation bases that could have been used in the examples in this chapter. It is safe to say that each substitute would have produced different cost results than the ones chosen.

Selected Indirect and Support Costs and Their Allocation Bases for Liberal Arts College

Clerical and support salaries, wages, and benefits
- Percentage of personnel compensation
- Credit hours
- Studies of staff time spent on activity

Executive administration
- Activity's percent of total direct costs
- Percentage of personnel compensation
- Studies of time devoted to activity

Human resources management, payroll, etc.
- Number of employees served
- Total employee head count
- Employees eligible for services
- Percentage of compensation or payroll

Computing, academic
- Measured use
- Prorated on basis of student/faculty use factor

Computing, administrative
- Measured use
- Prorated on basis of ad hoc use study

Library, library maintenance
- Student/faculty use factor
- Square footage

Admissions
- Percentage of matriculating students
- Credit hours

Registrar
- Head count
- Credit hours earned
- Degrees conferred

Student advisement
- Head count
- Credit hours

Financial aid
- Applications processed
- Head count of students with aid

Logistical services (mail service, work orders, accounts receivable, etc.)
- Number of documents processed
- Number of stations served
- Time studies

Repairs, replacements
- Square footage
- Time studies

Utilities
- Metered
- Square footage
- Use studies

Depreciation
- Total or assigned square footage
- Credit hours

earned during the year by each student. For two semesters, the average annual FTE enrollment of 2,202 students generates 59,670 credits at an average 13.549 semester credits per student. Of these credits, 2,130 are in the department of economics, and 144 are represented by Economics 101-1. Therefore, revenues of $86,654 are assigned to this course. Total revenues assigned to the Department of Economics are $1,327,189.

Figure 6.13 illustrates a partial listing of Department of Economics courses and their respective net revenues. The top half of the figure lists the credits earned, and the bottom half computes the decile group revenues generated for each course. The column marked "All Other" reports the unidentified credit hours and course revenues.

Plant Value, Square Footage, and Other Potential Allocation Data

Full costs for individual courses include several elements that will be allocated on the basis of total or assigned square feet of space used in instruction. Depreciation cost allocation to courses also requires information on the undepreciated historical value and the remaining useful life of facilities and equipment. This and any other information needed for allocating costs can be incorporated easily into the cost-course-load matrix.

Figure 6.14 identifies the allocation bases used in the subsequent illustrations in this chapter.

Course Depreciation Costs

The computation of depreciation costs that are to be allocated to courses requires detailed facilities and equipment inventories. Figure 6.15 summarizes the scope of plant and equipment depreciation for Liberal Arts College. It lists each facility and identifies the remaining asset values as well as the average useful-life years. Educational and general plant has been separated from auxiliary enterprises plant and from formal parking facilities.

Figure 6.16 addresses the issue of time- or use-weighted depreciation for classroom use. The exhibit identifies weekly classroom usage for one semester of building S. The building's total space is 72,304 square feet, of which 33,491 is classroom space.

Economics 101-1 occupies 825 square feet (room 1 in building S). By translating this square footage into square-foot hours, the time-weighted percentage of 1.6472 can be applied to the building's total depreciation for a precise use-weighted depreciation allowance of $522 for the room and $58 for Economics 101-1 (522 ÷ total room square-foot hours x Economics 101-1 square-foot hours, or 522 ÷ 22,275 x 2,475). This formula and figure 6.16 only address the direct course depreciation costs. The same use factor would be used for computing indirect and support depreciation-cost allocations.

Equipment depreciation costs depend in part on how much new equipment is added in a given year. When calculating plant depreciation costs, one should also make a distinction between the plant itself and the equipment and other installations in it that tend to wear out faster than the physical facility proper. Today, many colleges and universities do not make this distinction and therefore write off plant and equipment at too slow a pace. The data provided in figure 6.15 reflect these types of distinctions. The equipment component embodies sizable periodic equipment replacements.

Figure 6.14: Selected Cost Elements and Cost Allocation Bases for Liberal Arts College

Data Elements				
Enrollment				
Total Credit Hours	59,670			
Department of Economics Credit Hours	2,130			
Economics 101-1 Credit Hours	144			
Total Head Count	2,202			
Total FTE Enrollment	2,011			
Department of Economics Head Count	355			
Department of Economics FTE Enrollment	352			
Economics 101-1 FTE Enrollment	48			
Undepreciated Facilities		**Total**	**Plant**	**Equipment**
From Figure 6.15 (Column B-E)				
Total Square Feet	1,819,178	$43,331,250	$19,813,085	$23,518,165
E&G	773,534	22,635,642	9,342,131	13,293,511
Auxiliary Enterprises	641,382	17,824,251	7,599,596	10,224,655
Other	404,262	2,871,357	2,871,357	0
Depreciation		2,870,171	858,322	2,011,849
E&G		1,536,893	373,261	1,163,632
Auxiliary Enterprises		1,093,998	245,782	846,216
Other		238,280	238,280	0
Building S	72,304	63,416	11,191	52,225
Support Activities	123,498	219,771	105,974	113,797
Building S Usage (Figure 6.16)				
Total Square Foot Hours	1,352,264	$63,416*		
Room S1	22,275	1,586		
Economics 101-1, Room S1	2,475	85**		
Usage Factor, Economics 101-1	0.001830			
Economics 101-1 Support Usage	0.001066			
Depreciation by Credit Hours				
Total Credit Hours, E&G	59,670	$1,536,893		
Average Depreciation per Credit Hour		25.7565		
Average Depreciation per Three-Hour Course		77.2696		
Building S, Credit Hours	28,391	63,416		
Department of Economics, Credit Hours	2,130	4,757.7077		
Economics 101-1, Total Credit Hours	144	321.6478		
Economics 101-1, per Credit Hour		2.2337		
Economics 101-1, per Three-Credit Hours		6.7010		

* Annual weighted depreciation cost.

** Semester equivalent weighted depreciation cost.

Figure 6.15: Liberal Arts College's Facilities Inventory, Remaining Asset, and Useful-Life Values Using Straight-Line Method of Depreciation

E&G Plant (A)	Square Feet (B)	Undeprec. Value (C)	Equipment & Furnish. (D)	Plant (E)	Deprec. Equip. & Furnish. (F)	Deprec. Plant (G)	Total Deprec. (H)	Equip. Furnish. Avg. Yrs. from Inventory (I)	Plant Average (J)	Total Average (K)
Data Source	Inventory	Inventory	Inventory	Inventory	D + I	E + J	F + G	Inventory	Inventory	C + H
B	7,257	$8,001	$6,224	$1,777	$1,245	$148	$1,393	5	12	6
C	8,203	4,742,532	2,347,553	2,394,979	156,504	49,895	206,399	15	48	23
D	37,126	338,091	219,759	118,332	19,978	9,861	29,839	11	12	11
E	23,248	462,439	305,210	157,229	25,434	10,482	35,916	12	15	13
F	16,020	170,322	123,483	46,839	15,435	3,903	19,339	8	12	9
G	8,642	190,992	16,616	174,376	3,323	21,797	25,120	5	8	8
H	42,517	2,631,908	1,207,783	1,424,125	75,486	52,745	128,232	16	27	21
I	26,244	296,557	192,762	103,795	24,095	7,414	31,509	8	14	9
J	20,115	859,179	573,072	286,107	52,097	15,895	67,992	11	18	13
K	33,396	555,769	405,711	150,058	45,079	11,543	56,622	9	13	10
L	33,550	370,890	252,205	118,685	22,928	8,477	31,405	11	14	12
M	26,109	160,601	139,723	20,878	19,960	1,606	21,566	7	13	7
N	35,847	1,729,461	1,003,087	726,374	83,591	34,589	118,180	12	21	15
O	7,918	628,383	490,139	138,244	61,267	11,520	72,788	8	12	9
P	6,714	121,484	106,906	14,578	26,726	1,822	28,549	4	8	4
Q	34,145	1,091,445	829,498	261,947	92,166	11,907	104,073	9	22	10
R	50,413	898,652	790,814	107,838	71,892	5,676	77,568	11	19	12
S	72,304	626,701	470,026	156,675	52,225	11,191	63,416	9	14	10
T	11,568	45,497	30,028	15,469	4,290	1,289	5,579	7	12	8
U	23,294	97,421	76,963	20,458	12,827	1,860	14,687	6	11	7
V	19,043	58,231	44,256	13,975	11,064	1,553	12,617	4	9	5
W	33,997	1,181,573	732,575	448,998	61,048	16,036	77,084	12	28	15
X	106,512	2,379,841	1,475,501	904,340	98,367	25,121	123,487	15	36	19
Y	76,264	1,503,822	721,835	781,987	65,621	27,928	93,549	11	28	16
Z	9,563	1,485,850	731,781	754,069	60,982	29,003	89,984	12	26	17
Other	3,525	20,840	11,462	9,378	1,910	1,340	3,250	6	7	6
Total E&G	773,534	22,635,642	13,293,511	9,342,131	1,163,632	373,261	1,536,893	11	25	15
AA	38,813	4,579,582	2,266,893	2,312,689	151,126	49,206	200,332	15	47	23
BB	27,775	418,800	314,100	104,700	26,175	4,986	31,161	12	21	13
CC	34,652	413,100	309,825	103,275	28,166	5,436	33,601	11	19	12
DD	45,963	195,241	160,098	35,143	20,012	2,703	22,716	8	13	9
EE	34,652	433,335	312,001	121,334	31,200	6,741	37,941	10	18	11
FF	41,032	559,609	380,534	179,075	42,282	8,140	50,421	9	22	11
GG	41,358	172,425	125,870	46,555	17,981	2,910	20,891	7	16	8
HH	9,062	16,447	14,802	1,645	1,850	164	2,015	8	10	8
II	44,680	131,031	113,997	17,034	11,400	1,217	12,616	10	14	10
JJ	25,769	1,368,365	793,652	574,713	56,689	30,248	86,937	14	19	16
KK	44,580	4,369,639	2,272,212	2,097,427	151,481	42,805	194,285	15	49	22
LL	24,291	438,897	359,896	79,001	32,718	4,389	37,107	11	18	12
MM	63,011	2,869,318	1,520,739	1,348,579	108,624	51,868	160,493	14	26	18
NN	27,745	703,553	506,558	196,995	63,320	9,381	72,700	8	21	10
OO	23,282	349,924	251,945	97,979	27,994	5,443	33,437	9	18	10
PP	8,629	5,222	2,872	2,350	479	261	740	6	9	7
QQ	10,350	39,516	24,500	15,016	6,125	2,145	8,270	4	7	5
Misc. Small Houses	95,738	760,247	494,161	266,086	70,594	17,739	88,333	7	15	9
Total Auxiliary Enterprises	641,382	17,824,251	10,224,655	7,599,596	848,216	245,782	1,093,998	12	31	16
Dedicated Parking	404,262	2,871,357	0	2,871,357	0	239,280	239,280	0	12	12
Total Facilities	1,819,178	43,331,250	23,518,165	19,813,085	2,011,849	858,322	2,870,171	12	23	15

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Figure 6.16: Liberal Arts College's Depreciation Allowance for Classroom Use in Building S Based on 2,475 Square-Foot Hours for Economics 101-1

Building S Classrooms Annual Depreciation= $63,416 (Semester= $31,708)	Square Feet	Hours: Monday, Wednesday, Friday	Square-Foot Hours	Hours: Tuesday, Thursday	Square-Foot Hours	Total Square-Foot Hours	Usage Factor: Monday, Wednesday, Friday	Usage Factor: Tuesday, Thursday	Depreciation: Monday, Wednesday, Friday	Depreciation: Tuesday, Thursday	Total Depreciation
Room 1	825	9	22,275	7	11,550	33,825	1.6472%	0.8541%	$522	$271	$793
Room 2	1,166	8	27,984	5	11,660	39,644	2.0694	0.8623	656	273	930
Room 3	926	9	25,002	8	14,816	39,818	1.8489	1.0956	586	347	934
Room 4	782	9	21,114	9	14,076	35,190	1.5614	1.0409	495	330	825
Room 5	1,255	7	26,355	8	20,080	46,435	1.9490	1.4849	618	471	1,089
Room 6	968	9	26,136	9	17,424	43,560	1.9328	1.2885	613	409	1,021
Room 7	1,488	9	40,176	7	20,832	61,008	2.9710	1.5405	942	488	1,431
Room 8	1,292	9	34,884	7	18,088	52,972	2.5797	1.3376	818	424	1,242
Room 9	896	6	24,192	9	16,128	40,320	1.7890	1.1927	567	378	945
Room 10	928	9	25,056	9	16,704	41,760	1.8529	1.2353	588	392	979
Room 11	1,192	8	28,608	8	19,072	47,680	2.1156	1.4104	671	447	1,118
Room 12	1,321	8	31,704	8	21,136	52,840	2.3445	1.5630	743	496	1,239
Room 13	1,105	9	29,835	7	15,470	45,305	2.2063	1.1440	700	363	1,062
Room 14	1,102	9	29,754	6	13,224	42,978	2.2003	0.9779	698	310	1,008
Room 15	985	9	26,595	9	17,730	44,325	1.9667	1.3111	624	416	1,039
Room 16	1,355	9	36,585	6	16,260	52,845	2.7055	1.2024	858	381	1,239
Room 17	1,156	9	31,212	8	18,496	49,708	2.3081	1.3678	732	434	1,166
Room 18	956	9	25,812	9	17,208	43,020	1.9088	1.2725	605	403	1,009
Room 19	1,226	7	25,746	8	19,616	45,362	1.9039	1.4506	604	460	1,064
Room 20	1,685	8	40,440	6	20,220	60,660	2.9905	1.4953	948	474	1,422
Room 21	1,524	8	36,578	7	21,336	57,912	2.7048	1.5778	858	500	1,358
Room 22	1,382	9	37,314	8	22,112	59,426	2.7594	1.6352	875	518	1,393
Room 23	1,286	9	34,722	8	20,576	55,298	2.5677	1.5216	814	482	1,297
Room 24	944	9	25,488	6	11,328	36,816	1.8848	0.8377	598	266	863
Room 25	1,592	9	42,984	6	19,104	62,088	3.1787	1.4127	1,008	448	1,456
Room 26	1,621	8	38,904	5	16,210	55,114	2.8770	1.1987	912	380	1,292
Room 27	1,251	9	33,777	8	20,016	53,793	2.4978	1.4802	792	469	1,261
Room 28	1,282	9	34,614	7	17,948	52,562	2.5597	1.3273	812	421	1,232
Total	33,491	25.79	863,844	14.58	488,420	1,352,264	63.8813	36.1187	20,255	11,453	31,708

Note:

Room 1 Usage Factor: Monday, Wednesday, Friday	0.01647
Economics 101-1 Usage: Monday, Wednesday, Friday	0.00183
Building S Annual Depreciation	$63,416
Semester Equivalent	$31,708
Semester Depreciation Room 1	$397

The total depreciation for Building S is $63,416 or $31,708 for one semester. The rooms listed above exclude all but classroom and laboratory spaces. The total square footage is 72,304. The square footage for the rooms listed is 33,491. Therefore, the total depreciation cost for Building S is carried by this smaller square footage.

Allocating Departmental Natural Costs to Courses

The natural cost chart of accounts is the best indicator of how institutions invest their operating funds. Figures 6.17 and 6.18 display Liberal Arts Colleges natural costs. Figure 6.17 focuses on support costs. Figure 6.18 shows primary by-function costs and includes total support costs from figure 6.17.

Normally, natural tier-one direct operating costs are charged to the appropriate departmental natural cost lines and not directly to individual courses and activities. Figure 6.19 identifies the natural costs for the economics department reported in the year-end audit report. *Allocation Method* lists generally accepted methods for distributing departmental natural costs to individual courses. Institutions have discretion in how precisely and where they allocate costs to departments and from there to courses. In the context of figure 6.19, the term "direct" means that departmental charges are natural-cost specific. The term "formula" in figure 6.19 refers to the fact that some direct costs are charged on the basis of a specific prorating formula.

Formula-Based Prorating

Liberal Arts College tries to allocate costs as precisely as possible for each natural-cost account. Standard cost-prorating formulas are used to allocate the following types of tier-one costs for consumables: general institutional telecommunications costs, a portion of computer services costs, property and casualty insurance costs, purchased utilities costs, the cost of internally generated heating and cooling, and all tier-two through tier-four costs.

Until recently, Liberal Arts College did not allocate support costs to primary programs, departments, or courses and activities. Under SFAS No. 117, Liberal Arts College is experimenting with several course and academic full-cost approaches. All traditional and new allocation formulas used are based on historical trend-and-ratio studies of the costs that are being allocated. Management will review and, when necessary, modify the standard cost allocation models and at the end of each year will adjust any differences between standard and actual costs charged during the year.

The approach illustrated here stresses kind-for-kind prorating. In practice, many institutions will prorate costs without identifying specific natural costs: The supplying or selling department deducts the prorated-out costs from its total costs, and the user department receives these changes as prorated-in lump-sum costs. Normally, both in- and out-prorating occur on the same net-prorating line, thus obscuring further what actually happens to specific natural costs.

Kind-for-kind natural-cost allocation may appear to be, but is not necessarily, more complicated than lump-sum prorating. Even for the latter, internal prices or some sort of formula-based costs must be determined before a charge can occur. Thus, each charge might as well be shown at its appropriate natural cost site. Institutions will want to substitute their natural cost categories for those shown here. For summary presentations, personnel compensation and consumables cost totals can be combined, as shown in figures 1.3 and 1.5. The use of natural-cost allocation bases enhances costing precision since natural costs clearly meet the affinity test. With sufficient experience, institutions should be able to develop

Figure 6.17: Support Costs by Natural Cost Classifications for Liberal Arts College ($ in 1,000s)

Natural Costs Types of Support Costs	Academic Support	Library	Academic Computer Support	Executive Administration	24.50% to Auxiliary Enterprises	Executive Administration Net	General Institutional	Student Services	Public Relations and Development	O&M	Total Support
Personnel Compensation											
Salaries, Faculty	$32	$329	$119	$0	$0	$0	$0	$128	$0	$0	$608
Salaries, Officers	0	192	129	532	-130	402	68	161	97	115	1,164
Other Salaries and Wages	28	471	95	186	-46	140	385	895	576	1,553	4,143
Student Wages	12	98	35	22	-5	17	45	285	10	138	640
Subtotal	72	1,090	378	740	-181	559	498	14,69	683	1,806	6.555
Staff Benefits	25	295	116	242	-59	183	146	493	267	572	2,097
Tuition Benefit	0	35	25	75	-18	57	138	85	93	78	511
Room and Board Allowed	6	18	15	8	-2	6	185	69	18	41	358
Total Benefits	31	348	156	325	-79	246	469	647	378	691	2,966
Professional Services	0	15	5	10	-2	8	452	85	52	15	632
Total Compensation	103	1,453	539	1,075	-262	813	1,419	2,201	1,113	2,512	10,153
Consumables											
Travel, Entertainment	124	25	16	45	-11	34	21	408	89	52	769
Supplies	116	50	95	29	-7	22	68	159	35	123	668
Telecommunications, Measured	18	35	31	33	-8	25	52	79	81	33	354
Telecommunications, Prorated	9	27	21	22	-5	17	158	86	34	22	374
Computer Services, Measured	12	31	22	12	-3	9	15	14	11	12	126
Computer Services, Prorated	22	32	72	23	-6	17	53	55	23	19	293
Printing, Publications	12	12	32	81	-20	61	62	305	115	11	610
Property/Casualty Insurance	8	16	14	12	-3	9	52	18	17	15	149
Dues, Subscriptions	8	12	12	18	-4	14	18	21	28	8	121
Postage, Freight	15	38	8	32	-8	24	86	215	92	48	526
Repair, Replacement, Etc	86	237	111	58	-14	44	248	122	23	1,607	2,478
Utilities	20	86	21	18	-4	14	49	32	15	45	282
Food, Students	0	0	0	0	0	0	0	0	0	0	0
Food, Other	5	8	5	45	-11	34	12	75	55	12	206
Goods for Resale	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	57	37	16	55	-13	42	83	86	75	86	482
Subtotal	512	646	476	483	-117	366	977	1,675	693	2,093	7,438
Total Tier One	615	2,099	1,015	1,558	-379	1,179	2,396	3,876	1,806	4,605	17,591
Long-Term Debt Costs	0	0	0	0	0	0	0	0	0	33	33
Total Tier Two	615	2,099	1,015	1,558	-382	1,179	2,396	3,876	1,806	4,638	17,624
One-Year Assets	17	21	15	27	-7	20	38	19	12	49	191
Total Tier Three	632	2,120	1,030	1,585	-389	1,199	2,434	3,895	1,818	4,687	17,815
Depreciation	3	94	3	3	0	3	2	4	90	262	461
Total Tier Four	635	2,214	1,033	1,588	-389	1,202	2,436	3,899	1,908	4,949	18,276

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Figure 6.18: Primary Program Costs by Natural Cost Classification for Liberal Arts College ($ in 1,000s)

Natural Costs Types of Support Costs	Instruction	Research	Other	E&G	Auxiliary Enterprises	From Executive Administration Costs	Total Auxiliary Enterprises	All Other	Total Primary	Total Support	Total College Costs
Personnel Compensation											
Salaries, Faculty	$11,564	$583	$0	$12,147	$0	$0	$0	$0	$12,147	$608	$12,755
Salaries, Officers	395	0	0	395	217	130	347	0	742	1,164	1,906
Other Salaries and Wages	1,334	38	148	1,520	2,352	46	2,398	34	3,952	4,143	8,095
Student Wages	253	25	5	283	781	5	786	42	1,111	640	1,751
Subtotal	13,546	646	153	14,345	3,350	181	3,531	76	17,952	6,555	24,507
Staff Benefits	5,283	226	44	5,553	1,039	59	1,098	21	6,672	2,097	8,769
Tuition Benefits	518	18	0	536	95	18	113	0	649	511	1,160
Room and Board Alowed	116	11	2	129	246	2	248	0	377	358	735
Total Benefits	5,917	255	46	6,218	1,380	79	1,459	21	7,698	2,966	10,664
Professional Services	834	0	0	834	117	2	119	0	953	632	1,585
Total Compensation	20,297	901	199	21,397	4,847	262	5,109	97	26,603	10,153	36,756
Consumables											
Travel, Entertainment	466	4	8	478	216	11	227	21	726	769	1,495
Supplies	679	12	8	699	268	7	275	13	987	668	1,655
Telecommunications, Measured	86	2	3	91	58	8	66	14	171	354	525
Telecommunications, Prorated	54	1	2	57	129	5	134	12	203	374	577
Computer Services, Measured	86	19	1	106	33	3	36	27	169	126	295
Computer Services, Prorated	75	27	1	103	45	6	51	14	168	293	461
Printing, Publications	353	11	5	369	38	20	58	13	440	610	1,050
Property/Casualty Insurance	286	2	2	290	421	3	424	2	716	149	865
Dues, Subscriptions	185	1	1	187	4	4	8	1	196	121	317
Postage, Freight	122	1	13	136	38	8	46	1	183	526	709
Repair, Replacement, Etc.	471	12	8	491	1,469	14	1,483	12	1,986	2,478	4,464
Utilities	381	12	6	399	402	4	406	5	810	282	1,092
Food, Students	0	0	0	0	1,929	0	1,929	0	1,929	0	1,929
Food, Other	58	0	2	60	277	11	288	1	349	206	555
Goods for Resale	0	0	0	0	3,065	0	3,065	0	3,065	0	3,065
Miscellaneous	283	3	34	320	892	13	905	124	1,349	482	1,831
Subtotal	3,585	107	94	3,786	9,284	117	9,401	260	13,447	7,438	20,885
Total Tier One	23,882	1,008	293	25,183	14,131	379	14,510	357	40,050	17,591	57,641
Long-Term Debt Costs	382	7	0	389	273	0	273	0	662	33	695
Total Tier Two	24,246	1,015	293	25,572	14,404	379	17,783	357	40,712	17,624	58,336
One-Year Assets	121	5	3	129	82	7	89	11	222	191	413
Total Tier Three	24,385	1,020	296	25,701	14,486	386	14,872	368	40,934	17,815	58,749
Depreciation	1,255	35	11	1,301	1,094	3	1,097	14	2,409	461	2,870
Total Tier Four	25,640	1,055	307	27,022	15,580	389	15,969	382	43,343	18,276	61,619

Figure 6.19: Natural Cost Structure of FTFC Model at Liberal Arts College Showing Selected Cost Allocation Methods

Cost Center	Total College ($ in 1,000s)	Instruction ($ in 1,000s)	Department of Economics	Economics 101-1	Allocation Method
Consumables					
Travel, Entertainment	$1,495	$466	$16,634	?	Direct
Supplies	1,655	679	24,238	?	Direct
Telecommunications, Measured	525	86	4,025	?	Direct
Telecommunications, Prorated	577	54	1,928	?	Formula
Computer Services	295	86	3,070	?	Direct
Computer Services, Prorated	461	75	2,677	?	Formula
Printing, Publications	1,050	353	12,601	?	Direct
Property/Casualty Insurance	865	286	10,209	?	Formula
Dues, Subscriptions	317	185	6,604	?	Direct
Postage, Freight	709	122	4,355	?	Direct
Repair, Replacement, Contr.	4,464	371	13,243	?	Direct & Formula
Utilities Purchased	1,092	481	17,170	?	Direct & Formula
Food, Students	1,929	0	0	?	Not Applicable
Food, Other	555	58	2,070	?	Direct
Goods for Resale	3,065	0	0	?	Not Applicable
Miscellaneous	1,831	283	10,102	?	Direct & Formula
Subtotal	20,885	3,585	128,926	?	

costing parameters that charge not only direct, but indirect and support natural costs to individual course and activities.

Charging Direct and Indirect Departmental Costs to Courses

First, it must be remembered that departmental budgets already reflect which costs an institution normally allocates or charges to departments and how it allocates them. Second, courses and other institutional activities have their own direct and indirect costs. For instance, each semester, one-sixth of the Economics 101-1 professor's compensation is a direct Economics 101-1 cost, whereas portions of clerical costs and the department chair's compensation are among the course's indirect costs. How should these indirect costs be allocated?

Indirect departmental personnel compensation and consumables costs by and large are a function of the size of the staff employed, of course enrollments, or of the size of the facilities used. The corresponding allocation bases are the percentage of personnel or of employee compensation, of FTE enrollments or student credit hours, and of the value and the assigned square footage of classrooms and laboratories.

For the sake of this discussion, it is appropriate to look at course costs as if each course had its own full cost budget. If a cost, for instance, travel and entertainment, can be traced to a specific individual (i.e., the Economics 101-1 professor) and if it is of direct benefit to the course taught by that individual, the expense could be charged as a direct cost to the course's travel and entertainment line. On the other hand, if the travel and entertainment in question benefits the department as a whole, the cost could then be allocated as an indirect cost to all courses on some basis. Such distinctions, however, are usually lost, in the absence of course budgets, once specific costs have been charged to the department. The direct connection of a cost to an employee or to a course must be established early in the course-cost-load matrix so that the first direct-cost allocation occurs at the course or activity level and not at the department level.

Some consumables costs are a function of usage, a popular type of allocation base. Usage-based cost allocations can become overly complicated and may not be cost-effective in their own right. On the other hand, usage clearly describes how some administrative offices and personnel spend their time. Determining the cost-effectiveness of these activities is sometimes essential.

Simplified Course Full Costing Using Natural Costs

In computing course costs, it is often desirable to make the allocation of departmental costs as simple as possible. Figures 6.20, 6.21, and 6.22 show increasingly complex allocation patterns and illustrate the effects on Economics 101-1 natural costs when three different combinations of allocation methods are implemented prior to allocating support costs to Economics 101-1.

When allocating costs to courses, credit hours can serve as a useful across-the-board allocation base.

Multiple Allocation Bases

In practice, however, multiple allocation bases are in widespread use. Figures 6.21 and 6.22 show two multiple allocation base models for Liberal Arts College. In figure 6.21, square footage is added for a few natural-cost categories, and figure 6.22 adds a few refinements to the allocation of personnel costs. The three exhibits (figures 6.20 through 6.22) do not yet include allocated support costs.

Allocating Support Costs

Figures 6.23 through 6.25 add a column for support costs. The same three allocation alternatives are used as in the preceding exhibits. *Total Support* in figure 6.17 is used as a departure point for all calculations in the support costs column of the three exhibits. Support costs moderately increase costs for Economics 101-1.

Figure 6.26 compares the Economics 101-1 costs for the six examples. On balance, the cost differences between the six versions are not trivial. The difference between the smallest and the largest cost, excluding support, is worth noting. Figure 6.21 shows the smallest total tier-four cost of $14,240 versus a high of $18,478 for figure 6.22. The difference of $4,238 is 29.76 percent. For tier-four costs that include allocations for support, the difference between the lowest and the highest is $4,910 or 34.38 percent.

If the choice of different combinations of cost allocation bases and methods can produce such large differences in the total cost of a single course, it stands to reason that when all courses of an institution are taken into account, such large potential differentials raise a serious credibility issue when institutions compare such costs. These illustrations suggest at the very least that inter-institutional micro-cost comparisons be carried out on the basis of uniform or near-uniform allocation methods.

Figure 6.20: Single Allocation Base: Student Credit Hours (Support Costs Not Yet Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Total (G)	Allocation Method or Base (H)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Calculated	
Personnel Compensation							
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$39	$10,022	Credit Hours
All Other Salaries and Wages	10,001	1,729	58,395	0	141	141	Credit Hours
Student Wages	1,751	253	13,000	0	31	31	Credit Hours
Subtotal	24,507	13,546	568,477	9,983	211	10,194	
Staff Benefits	8,769	5,283	164,973	2,578	11	2,589	Credit Hours
Tuition Benefit	1,160	518	48,072	0	0	22	Credit Hours Clerical
Room and Board, Etc.	735	116	3,697	0	11	11	Credit Hours
Total Benefits	10,664	5,917	216,742	2,578	21	2,621	
Professional Services	1,585	834	36,350	0	0	0	Direct Only
Total Compensation	36,756	20,297	821,569	12,561	233	12,815	
Consumables							
Travel, Entertainment	1,495	466	16,634	78	40	118	Credit Hours
Supplies	1,655	679	24,238	194	58	252	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	10	Credit Hours
Telecommunications, Prorated	577	54	1,928	0	5	5	Credit Hours
Computer Services	295	86	3,070	185	7	192	Credit Hours
Computer Services, Prorated	461	75	2,677	0	6	6	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	253	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	25	25	Credit Hours
Dues, Subscriptions	317	185	6,604	75	16	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	42	Credit Hours
Repair & Replacement, Plant	4,464	471	13,243	0	32	32	Credit Hours
Utilities Purchased	1,092	381	17,170	0	41	41	Credit Hours
Food, Students	1,929	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	30	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	150	Credit Hours
Total Consumables	20,885	3,585	128,926	938	309	1,247	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	541	14,062	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	4	4	Credit Hours
Total Tier Two	58,336	24,264	951,947	13,499	545	14,066	
One-Year Assets	413	121	5,500	155	13	168	Credit Hours
Total Tier Three	58,749	24,385	957,447	13,654	558	14,234	
Depreciation	2,870	1,255	4,598	58	11	69	Credit Hours
Total Tier Four	61,619	25,640	962,045	13,712	569	14,302	
Net Student Revenues	44,445	36,025	1,327,189			86,654	
Surplus/Deficit*	-17,174	10,385	365,144			72,352	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction. Some of the indirect costs would be charged to activities ignored here.

Credit hour allocation = (column D - column E) + 59,670 x 144

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Figure 6.21: Multiple Allocation Bases: Version A (Support Costs Not Yet Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Total (G)	Allocation Method or Base (H)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Calculated	
Personnel Compensation							
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$39	$10,022	Credit Hours
All Other Salaries and Wages	10,001	1,729	58,395	0	141	141	Credit Hours
Student Wages	1,751	253	13,000	0	31	31	Credit Hours
Subtotal	24,507	13,546	568,477	9,983	211	10,194	
Staff Benefits	8,769	5,283	164,973	2,578	11	2,589	Credit Hours
Tuition Benefit	1,160	518	48,072	0	0	0	Credit Hours Clerical
Room and Board, Etc.	735	116	3,697	0	0	0	Credit Hours
Total Benefits	10,664	5,917	216,742	2,578	11	2,589	
Professional Services	1,585	834	36,350	0	0	0	Direct Only
Total Compensation	36,756	20,297	821,569	12,561	222	12,783	
Consumables							
Travel, Entertainment	1,495	466	16,634	78	40	118	Credit Hours
Supplies	1,655	679	24,238	194	58	252	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	10	Credit Hours
Telecommunications, Prorated	577	54	1,928	0	5	5	Credit Hours
Computer Services	295	86	3,070	185	7	192	Credit Hours
Computer Services, Prorated	461	75	2,677	0	6	6	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	253	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	19	19	Square Feet
Dues, Subscriptions	317	185	6,604	75	16	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	42	Credit Hours
Repair & Replacement, Plant	4,464	471	13,243	0	24	24	Square Feet
Utilities Purchased	1,092	381	17,170	0	31	31	Square Feet
Food, Students	1,929	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	30	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	150	Credit Hours
Total Consumables	20,885	3,585	128,926	938	285	1,223	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	507	14,006	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	3	3	Square Feet
Total Tier Two	58,336	24,264	951,947	13,499	510	14,009	
One-Year Assets	413	121	5,500	155	10	165	Square Feet
Total Tier Three	58,749	24,385	957,447	13,654	520	14,174	
Depreciation	2,870	1,255	4,598	58	8	66	Square Feet
Total Tier Four	61,619	25,640	962,045	13,712	528	14,240	
Net Student Revenues	44,445	36,025	1,327,189			86,654	
Surplus/Deficit*	-17,174	10,385	365,144			72,414	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction. Some of the indirect costs would be charged to activities ignored here.

Credit hour allocation = (column D - coulmn E) + 59,670 x 144

Square foot allocation = (column D - column E) x .00183

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Figure 6.22: Multiple Allocation Bases: Version B (Support Costs Not Yet Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Total (G)	Allocation Method or Base (H)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Calculated	
Personnel Compensation							
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$413	$10,396	2.56% Faculty Load
All Other Salaries and Wages	10,001	1,729	58,395	0	1,495	1,495	2.56% Faculty Load
Student Wages	1,751	253	13,000	0	156	156	1.23% Time on Course
Subtotal	24,507	13,546	568,477	9,983	2,064	12,047	
Staff Benefits	8,769	5,283	164,973	2,578	1,962	4,540	% of Benefits
Tuition Benefit	1,160	518	48,072	0	371	371	% Benefits Clerical Only
Room and Board, Etc.	735	116	3,697	0	63	63	% of Benefits
Total Benefits	10,664	5,917	216,742	2,578	2,396	4,974	
Professional Services	1,585	834	36,350	0	0	0	Direct Only
Total Compensation	36,756	20,297	821,569	12,561	4,460	17,021	
Consumables							
Travel, Entertainment	1,495	466	16,634	78	40	118	Credit Hours
Supplies	1,655	679	24,238	194	58	252	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	10	Credit Hours
Telecommunications, Prorated	577	54	1,928	0	5	5	Credit Hours
Computer Services	295	86	3,070	185	7	192	Credit Hours
Computer Services, Prorated	461	75	2,677	0	6	6	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	253	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	19	19	Square Feet
Dues, Subscriptions	317	185	6,604	75	16	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	42	Credit Hours
Repair & Replacement, Plant	4,464	471	13,243	0	24	24	Square Feet
Utilities Purchased	1,092	381	17,170	0	31	31	Square Feet
Food, Students	1,929	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	30	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	150	Credit Hours
Total Consumables	20,885	3,585	128,926	938	285	1,223	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	4,745	18,244	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	3	3	Square Feet
Total Tier Two	58,336	24,264	951,947	13,499	4,747	18,246	
One-Year Assets	413	121	5,500	155	10	165	Square Feet
Total Tier Three	58,749	24,385	957,447	13,654	4,757	18,411	
Depreciation	2,870	1,255	4,598	58	8	66	Square Feet
Total Tier Four	61,619	25,640	962,045	13,712	4,766	18,478	
Net Student Revenues	44,445	36,025	1,327,189			86,654	
Surplus/Deficit*	-17,174	10,385	365,144			68,176	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction.

Credit hour allocation = (column D - column E) ÷ 59,670 x 144

Square foot allocation = (column D - column E) x .00183

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Figure 6.23: Single Allocation Base: Student Credit Hours (Support Costs Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Support Costs (G)	Economics 101-1 Total (H)	Allocation Method or Base (I)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Fig. 6.17 Calculated	Calculated	
Personnel Compensation								
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$39	$1	$10,023	Credit Hours
All Other Salaries and Wages	10,001	1,729	58,395	0	141	13	154	Credit Hours
Student Wages	1,751	253	13,000	0	31	2	33	Credit Hours
Subtotal	24,507	13,546	568,477	9,983	211	16	10,210	
Staff Benefits	8,769	5,283	164,973	2,578	11	5	2,594	Credit Hours
Tuition Benefit	1,160	518	48,072	0	0	1	1	Credit Hours Clerical
Room and Board, Etc.	735	116	3,697	0	11	1	12	Credit Hours
Total Benefits	10,664	5,917	216,742	2,578	21	7	2,607	
Professional Services	1,585	834	36,350	0	0	2	2	
Total Compensation	36,756	20,297	821,569	12,561	233	25	12,818	
Consumables								
Travel, Entertainment	1,495	466	16,634	78	40	2	120	Credit Hours
Supplies	1,655	679	24,238	194	58	2	254	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	1	11	Credit Hours
Telecommunications, Prorated	577	54	1,928	0	5	1	6	Credit Hours
Computer Services	295	86	3,070	185	7	0	192	Credit Hours
Computer Services, Prorated	461	75	2,677	0	6	1	7	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	1	254	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	25	0	25	Credit Hours
Dues, Subscriptions	317	185	6,604	75	16	0	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	1	44	Credit Hours
Repair & Replacement, Plant	4,464	471	13,243	0	32	6	38	Credit Hours
Utilities Purchased	1,092	381	17,170	0	41	1	42	Credit Hours
Food, Students	1,929	0	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	1	30	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	1	151	Credit Hours
Total Consumables	20,885	3,585	128,926	938	309	18	1,265	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	541	42	14,083	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	4	0	4	Credit Hours
Total Tier Two	58,336	24,264	951,947	13,499	545	43	14,087	
One-Year Assets	413	121	5,500	155	13	0	168	Credit Hours
Total Tier Three	58,749	24,385	957,447	13,654	558	43	14,255	
Depreciation	2,870	1,255	4,598	58	11	1	70	Credit Hours
Total Tier Four	61,619	25,640	962,045	13,712	569	44	14,326	
Net Student Revenues	44,445	36,025	1,327,189				86,654	
Surplus/Deficit*	-17,174	10,385	365,144				72,328	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction. Some of the indirect costs would be charged to activities ignored here.

Credit hour allocation = (column D - column E) + 59,670 x 144

Figure 6.24: Multiple Allocation Bases: Version A (Support Costs Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Support Costs (G)	Economics 101-1 Total (H)	Allocation Method or Base (I)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Fig. 6.17 Calculated	Calculated	
Personnel Compensation								
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$39	$1	$10,023	Credit Hours
All Other Salaries and Wages	10,001	1,729	58,395	0	141	13	154	Credit Hours
Student Wages	1,751	253	13,000	0	31	2	33	Credit Hours
Subtotal	24,507	13,546	568,477	9,983	211	16	10,210	
Staff Benefits	8,769	5,283	164,973	2,578	11	5	2,594	Credit Hours
Tuition Benefit	1,160	518	48,072	0	0	1	1	Credit Hours Clerical
Room and Board, Etc.	735	116	3,697	0	0	1	1	Credit Hours
Total Benefits	10,664	5,917	216,742	2,578	11	7	2,596	
Professional Services	1,585	834	36,350	0	0	2	2	Direct Only
Total Compensation	36,756	20,297	821,569	12,561	222	25	12,808	
Consumables								
Travel, Entertainment	1,495	466	16,634	78	40	2	120	Credit Hours
Supplies	1,655	679	24,238	194	58	2	254	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	1	11	Credit Hours
Telecommunications, Prorated	577	54	1,928	0	5	1	6	Credit Hours
Computer Services	295	86	3,070	185	7	0	192	Credit Hours
Computer Services, Prorated	461	75	2,677	0	6	1	7	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	1	254	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	19	0	19	Square Feet
Dues, Subscriptions	317	185	6,604	75	16	0	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	1	43	Credit Hours
Repair & Replacement, Plant	4,464	471	13,243	0	24	5	29	Square Feet
Utilities Purchased	1,092	381	17,170	0	31	1	32	Square Feet
Food, Students	1,929	0	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	1	31	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	1	151	Credit Hours
Total Consumables	20,885	3,585	128,926	938	285	16	1,239	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	507	41	14,047	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	3	0	3	Square Feet
Total Tier Two	58,336	24,264	951,947	13,499	510	41	14,050	
One-Year Assets	413	121	5,500	155	10	0	165	Square Feet
Total Tier Three	58,749	24,385	957,447	13,654	520	41	14,215	
Depreciation	2,870	1,255	4,598	58	8	1	67	Square Feet
Total Tier Four	61,619	25,640	962,045	13,712	528	42	14,282	
Net Student Revenues	44,445	36,025	1,327,189				86,654	
Surplus/Deficit*	-17,174	10,385	365,144				72,372	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction. Some of the indirect costs would be charged to activities ignored here.

Credit hour allocation = (column D - column E) ÷ 59,670 x 144

Square foot allocation = (column D - column E) x .00183

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Figure 6.25: Multiple Allocation Bases: Version B (Support Costs Allocated)

Cost (A)	Total College ($ in 1,000s) (B)	Instruction ($ in 1,000s) (C)	Department of Economics (D)	Economics 101-1 Direct** (E)	Economics 101-1 Indirect (F)	Economics 101-1 Support Costs (G)	Economics 101-1 Total (H)	Allocation Method or Base (I)
Data Source	Fig. 6.18	Fig. 6.18	Audit or Budget	Fig. 6.4 & CLM	Calculated	Fig. 6.17 Calculated	Calculated	
Personnel Compensation								
Salaries, Faculty	$12,755	$11,564	$497,082	$9,983	$413	$16	$10,412	2.56% Faculty Load
All Other Salaries and Wages	10,001	1,729	58,395	0	1,495	136	1,631	2.56% Faculty Load
Student Wages	1,751	253	13,000	0	156	8	164	1.23% Time on Course
Subtotal	24,507	13,546	568,477	9,983	2,064	160	12,206	
Staff Benefits	8,769	5,283	164,973	2,578	1,962	511	5,051	% of Benefits
Tuition Benefit	1,160	518	48,072	0	371	21	392	% Benefits Clerical Only
Room and Board, Etc.	735	116	3,697	0	63	6	69	% of Benefits
Total Benefits	10,664	5,917	216,742	2,578	2,396	538	5,512	
Professional Services	1,585	834	36,350	0	0	0	0	Direct Only
Total Compensation	36,756	20,297	821,569	12,561	4,460	698	17,718	
Consumables								
Travel, Entertainment	1,495	466	16,634	78	40	2	120	Credit Hours
Supplies	1,655	679	24,238	194	58	2	254	Credit Hours
Telecommunications, Measured	525	86	4,025	0	10	1	11	Credit Hours
Telecommunications, Pror	577	54	1,928	0	5	1	6	Credit Hours
Computer Services, Measured	295	86	3,070	185	7	0	192	Credit Hours
Computer Services, Pror	461	75	2,677	0	6	1	7	Credit Hours
Printing, Publications	1,050	353	12,601	223	30	1	254	Credit Hours
Property/Casualty Insurance	865	286	10,209	0	19	0	19	Square Feet
Dues, Subscriptions	317	185	6,604	75	16	0	91	Credit Hours
Postage, Freight	709	122	4,355	32	10	1	43	Credit Hours
Repair, Replacement, Contr.	4,464	471	13,243	0	24	5	29	Square Feet
Utilities Purchased	1,092	381	17,170	0	31	1	32	Square Feet
Food, Students	1,929	0	0	0	0	0	0	
Food, Other	555	58	2,070	25	5	1	31	Credit Hours
Goods for Resale	3,065	0	0	0	0	0	0	
Miscellaneous	1,831	283	10,102	126	24	1	151	Credit Hours
Total Consumables	20,885	3,585	128,926	938	285	17	1,240	Credit Hours
Total Tier One	57,641	23,882	950,495	13,499	4,745	715	18,959	Credit Hours
Long-Term Debt Costs	695	382	1,452	0	3	0	3	Square Feet
Total Tier Two	58,336	24,264	951,947	13,499	4,747	0	18,246	
One-Year Assets	413	121	5,500	155	10	0	165	Square Feet
Total Tier Three	58,749	24,385	957,447	13,654	4,757	0	18,411	
Depreciation	2,870	1,255	4,598	58	8	0	66	Square Feet
Total Tier Four	61,619	25,640	962,045	13,712	4,766	0	18,478	
Net Student Revenues	44,445	36,025	1,327,189				86,654	
Surplus/Deficit*	-17,174	10,385	365,144				68,176	

* Before all non-student-related revenues and transfers.

** Direct course costs other than personnel compensation are identified by means of invoice references when they are charged to departmental natural costs.

Note: In from-the-bottom-up costing, the sum of course costs equals departmental costs, the sum of departmental costs equals the cost of instruction, and the sum of all primary program costs equals total institutional costs. This illustration ignores departmental research and other departmental activities that constitute functional subheadings under instruction.

Credit hour allocation = (column D - column E) ÷ 59,670 x 144

Square foot allocation = (column D - column E) x .00183

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Figure 6.26: Comparison of Six Economics 101-1 Full Costs at Liberal Arts College

Cost Centers	Figure 6.20	Figure 6.21	Figure 6.22	Figure 6.23	Figure 6.24	Figure 6.25
Personnel Compensation	$12,815	$12,783	$17,021	$12,817	$12,806	$17,718
Consumables	1,247	1,223	1,223	1,265	1,239	1,240
Total Tier One	14,062	14,006	18,244	14,082	14,045	18,958
Long-Term Debt Costs	4	3	3	4	3	3
Total Tier Two	14,066	14,009	18,247	14,086	14,048	18,961
One-Year Assets	168	165	165	168	165	165
Total Tier Three	14,234	14,174	18,412	14,254	14,213	19,126
Depreciation	69	66	66	70	67	66
Total Tier Four	14,303	14,240	18,478	14,324	14,280	19,192
Net Student Revenues	86,654	86,654	86,654	86,654	86,654	86,654
Surplus/Deficit	72,351	72,414	68,176	72,330	72,374	67,462
Cost Difference from Lowest to Highest			4,238 29.76%			4,912 34.40%

The important reason why different allocation methods often produce large differences in costs is simple: There is no connection whatsoever between credit hours, time-weighted square footage, faculty work loads, or personnel compensation shares. Each allocation base produces its own divisors and allocation factors, and each mixture of allocation bases will produce its distinct course cost result.

Institutions with an established course and activity full-cost track record should have little difficulty assembling future annual budgets and cost reports from the ground up rather than from the top down. With practice, they should be able to develop suitable indirect natural-cost-crossover factors of the types illustrated in the three costing versions shown here. Since there is no absolutely correct allocation base mix, institutions might eventually settle on the credit-hour model whose principal merit lies in its simplicity. The credit-hour approach also facilitates inter-institutional comparability and may enhance the credibility of industrywide course and activity-cost information. Perhaps the next best solution is to use the allocation bases and factors mandated by Office of Management and Budget Circular A-21 and related documents.[3]

Shared Courses, Shared Staff, and Shared Facilities

Finally, it may be appropriate to call attention to aspects of costing not illustrated here. All institutions offer courses taught by two or more persons. Many courses generate student credits in two or more departments. Courses are taught wherever there is space, and classroom facilities are less often dedicated to a single department or discipline than they may have been in the past.

This sharing of personnel and facilities and joint course credits create complications in the costing of courses which can be overcome once the respective data modules have identified the underlying variables. It is important to always define clearly which portion of an instructor's work load is to be assigned to which course. When two individuals teach one course and each is credited with a full course load, the compensation cost of such a course increases dramatically. Students do not earn multiple course credits merely because more than one faculty member is involved. If the work-load credits are reduced for each teacher, the cost of the course will be less.

Effect on Allocated Costs of Various Allocation Bases

Chapter 6 illustrates indirect- and support-cost allocations based on credit hours earned and on time-weighted square footage. On balance, the credit-hour allocation base yields higher allocated costs. The figure below shows the effects on allocated costs when an identical cost is distributed in terms of completely unrelated allocation bases, each displaying a reasonable affinity with the cost objective.

Alternative Allocation Bases and Their Effects on Allocated Costs at Liberal Arts College

Allocation Method	Allocation Factor or Number	Allocated Cost
Allocation Method		
Credit Hours	(50,000 ÷ 59,670) x 144	$120.66
Four Credits Equivalent		160.88
FTE Enrollment	(50,000 ÷ 2,202) x 48	1,089.92
Square Feet, Room 1	(50,000 ÷ 33,491) x 825	1,231.67
Square-Foot Hours, Room 1	(50,000 x .00183)	91.50

Unless institutions use the same allocation bases for specific indirect and support costs within a peer group, these cost differences suggest that the resulting comparative course costs are not very meaningful. The difference between the credit-hour and the FTE-enrollment allocation bases is striking because each base represents the same enrollment. The 144 credit hours and 48 students represent the same enrollment effect, but entirely different cost-recovery effects. It is not surprising, then, that institutions prefer the FTE approach under Circular A-21.

If a given course generates academic credits in more than one department, the costs should be shared among the departments. This means that under certain circumstances administrative and clerical support of two or more departments will be assigned to the course

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or courses in question. Institutions should develop clear costing guidelines whenever multiple personnel or two or more departments are involved in a course.

Finally, most classroom space is fungible in that it can be used more or less without regard to individual academic disciplines. In practice, territorial habits develop so that facilities may remain unused. Many specialized facilities, particularly laboratories, can only be used for certain types of instruction. Most institutions maintain detailed facilities inventories, permitting very precise, even time-use-weighted, allocations of space costs. Whether or not certain facilities are shared by two or more disciplines, departments, or professional schools is therefore not a material issue in the costing of courses and other activities.

Notes

1. NACUBO and NCHEMS, *Procedures for Determining Historical Full Costs: The Costing Component of the Information Exchange Procedures.*, 2nd ed., Technical Report 65 (Washington, D.C.: NACUBO and Boulder, Colo.: NCHEMS, 1977). NACUBO and NCHEMS, *Costing for Policy Analysis* (Washington, D.C.: NACUBO, 1980).
2. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for-Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993).
3. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21; reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994).

Exercises

Using the following spreadsheet, indicate how you would determine the cost of a course of your choice and, specifically, how you would allocate the types of natural costs listed (substituting your own natural-cost classification).

Worksheet 6.1: Allocating Indirect and Support Costs to Course X at Your Institution

Cost Centers	Total Institution	Instruction	Department X Direct	Department X Indirect	Department X Support Costs	Allocation Bases
Personnel Compensation						
Salaries, Faculty						
Salaries, Other						
All Other Salaries and Wages						
Student Wages						
Subtotal						
Benefits						
Professional Services						
Total Compensation						
Consumables						
Travel, Entertainment						
Supplies						
Telecommunications						
Computer Services,						
Printing, Publications						
Property/Casualty Insurance						
Dues, Subscriptions						
Postage, Freight						
Repair, Replacement, Contr.						
Utilities Purchased						
Fuel, Gas, Coal						
Food						
Goods for Resale						
Annuities						
Miscellaneous						
Subtotal						
Adjustments						
Total Tier One						
Long-Term Debt Costs						
Total Tier Two						
One-Year Assets						
Library Acquisitions						
All Other						
Total Tier Three						
Depreciation						
Total Tier Four						
Support Before						
Allocation to Course						
Academic Support						
Administrative Support						
Student Services						
Development						
O&R of Plant						
Total Support						

— 7 —

Costing of Support Activities: Total Cost Management, Activity-Based Costing, and Process-Cost Management

This chapter answers the following questions:

- What types of operational costing tasks, affecting support services, preoccupy colleges and universities?
- What is the meaning of total cost management, and how can activity-based costing and process-cost management be implemented in higher education?
- How might institutions begin to implement total cost management, activity-based costing, and process-cost management, and what pitfalls would they face?

Not-So-Novel Costing Innovations

Novel costing concepts proffered from time to time by management theorists and consultants arise in part when new insights convince managers that existing cost accounting systems no longer meet an enterprise's current and long-term needs. Others are not really new, but only older theories and practices that have been given new names. This chapter deals with both.

Historically, new cost accounting theories have emerged primarily in for-profit manufacturing and less frequently in the service sector. Gradually, many costing innovations will be adapted to higher education costing. Total cost management, activity-based costing, and process-cost management are typical examples.[1]

NACUBO's Benchmarking Project

In 1994, NACUBO, in cooperation with Coopers & Lybrand and Barbara S. Shafer & Associates, published the *Process Costing Workbook FY 1994,* which was part of the association's ongoing Benchmarking Project, started in 1991.[2] This project, involving some 240 colleges and universities, encourages institutions to work together, to identify management areas where performance can or should be improved, and to highlight management techniques that help them set performance objectives based on comparative cost data and other performance information. The workbook is only available to Benchmarking Project participants.

Benchmarking: An Old Tool in New Clothing

Today, the term "benchmarking" is everywhere, from CNBC advertisements to political speeches. In its modern guise, benchmarking implies that an institution will select best competitive performance indicators as target objectives in an attempt to meet or surpass them. Of course, looking at peer institutions for guidance on many different aspects of institutional performance is an honorable and long-standing tradition in higher education. Few if any institutional decisions occur in the absence of comparative information, and indicators of performance are featured in numerous studies and continue to be disseminated by government agencies and private groups.

Emphasis on Activities Other Than Instruction and Research

Most of the interesting costing tasks in higher education relate to an institution's daily support operations. In practice, operating an institution of higher education means that many distinct activities are combined to render specific services that cut across jurisdictional and managerial settings. Higher education activities management is quite decentralized, and many managerial objectives are more or less narrowly circumscribed and seldom focus on the enterprise as a whole. In practice, managers at colleges and universities pay primary attention to their particular areas of influence, some of them quite limited in scope.

The preceding chapters make clear that neither higher education financial accounting nor program-cost accounting are designed to highlight the costs of the products and services normally rendered by colleges and universities. In contrast, the accounting concepts which are the subject of this chapter are service-specific. It is therefore important to choose and define carefully those college and university services that might be amenable to total cost management and that will entail a fundamental change in the organization of the underlying cost and cost-related information.

The costing of courses and research projects is well developed in higher education, although there are differences of opinion and practice concerning specific details and on whether or not, or how, full costing should be carried out. The preceding discussion did not relate to total cost management accounting requirements, nor did it take into account the special features of activity-based costing and process-cost management, which are more readily associated with activities other than instruction and research. Specifically, total cost management, activity-based costing, and process-cost management are best implemented in the numerous support services of colleges and universities.

Common Features in Operational Support Costing

Several common features of operational support costing can be summed up in the following questions:

- How much net profit or net loss does a service or activity contribute currently to the institution's bottom line?
- What is the level of quality of the specific service or activity?
- What quantity of this activity is provided and how often?
- How many persons are directly involved in this activity?
- What specific nonpersonnel resources are directly involved?
- What specific indirect personnel and material resources are involved?
- How can the production or service-rendering process be described?
- Do alternate processes exist and is there a best choice? If so, what is it?
- What specific activity or process changes are needed to implement a better or best resources mix?
- What is the estimated or actual net contribution to the bottom line of the activity after the implementation of specific changes?

If total cost management in higher education focuses principally on activities other than instruction and research, the net contribution to the bottom line will be mostly in the form of larger or smaller net support costs. For some types of activities (e.g., fund raising, enrollment management, and accounts receivable management), emphasis on costs alone may be inappropriate and the activities' net revenue or net rate of return must be considered instead.

Each college and university is involved in work processes that have their counterparts elsewhere. Higher education managerial networks are very much tuned in to how institutions can improve their management techniques and performance. NACUBO's Benchmarking Project and the work of NACUBO's regional associations play important roles in these efforts. In general, colleges and universities are very generous in sharing their cost-reduction experiences and are normally willing to assist others in implementing procedures they have found profitable.

Most total cost management-related cost-analysis and cost-cutting efforts lead to or depend upon the creation of specialized cost models, many of them unique to a particular institution. One's study of these cost-reduction and management-improvement projects reveals how individual institutions and managers implement the latest cost-reduction know-how gleaned from other institutions, the professional literature, specialized seminars, and scientific and applied research.

The Meaning of Total Cost Management

Total cost management is the practice of analyzing and improving an institution's financial and qualitative performance when it produces a particular product or when it renders a specific service. Total cost management pays attention to the complete work processes and to all related activities through which the product or service comes about.

A work process is defined as any set of interrelated institutional or managerial activities that results in an identifiable or measurable service or product for a particular clientele. A work process is seen as adding value for which a client might be willing to or should pay a price. At the very least, each work process engenders direct costs because it consumes financial, human, and material resources.

At issue is, first, how efficiently the process is executed and, second, how inexpensively it is carried out. Costs represent one dimension of the added value; client or user satisfaction through an evaluation of the quality of service is the other.

In higher education, the most practical approach may be for an institution to select specific, though not necessarily related, work processes and to evaluate them from the perspective of total cost management. Any service chosen may consume resources from many parts of the institution. Process analysis should lead to both improved process outcomes and reduced costs.

Total Cost Management Means Understanding and Managing Entire, Sometimes Very Complex, Work Processes

Employee-centered work processes are at the heart of total cost management. Most college and university support activities represent work processes where individual employees and groups of employees perform specific tasks in specific ways within a given time span. They collect funds, fill out forms, distribute mail, repair or install equipment, paint walls, clean floors, construct bookshelves or entire structures, conduct interviews with prospective students, package financial aid, spend time in committee or staff meetings, travel to see prospective students and donors, and go to seminars and professional meetings to learn new ways of doing their job, to expand their peer networks, and to make a mark for their institution and for themselves in other ways. In carrying out their professional endeavors, they consume all manner of resources and affect, in each person's special way, the fate and performance of their immediate responsibilities, their department, and of the institution overall. Understanding work processes means understanding what individual employees and groups of employees do, how they do it, and how long it takes them to do it.

Many of the most complex college and university process costs arise in the production of current revenues and capital resources (e.g., tuition, gifts, and research grants). Other process costs occur because direct services are rendered to students and other institutional clienteles (student invoices, student aid applications, applications of new students). Still other process costs derive from the periodic cycles of administrative work or involve routine logistical tasks (e.g., monthly budget reports; work- and purchase-order initiation, routing, and implementation; financial audits; and accounts receivable and payable execution). Often, these types of processes intertwine.

The following is a selective list of more or less complex processes within colleges and universities:

The process of developing new financial resources

- Operating gifts and grants
  - Private sector gifts and grants development
  - Public sector gifts, grants, and contracts development
    - Federal research grants development
    - State and local government grants development
- Student aid grants and loan funds
- New capital resources development
  - New plant funds development
  - New endowment funds development
  - Bequests development

The process of developing new customers

- Undergraduate and graduate enrollment management
- New course and other curricular development
- New academic program development and strategic positioning
- New research program development

Operational processes

- Materials handling and inventory control
- Student billing and collections process or, more generally, accounts receivable process management
- Student financial aid applications processing
- Accounts payable processing
- Student records processing
  - Grades processing
  - Room scheduling
  - Degree requirements processing and control
- Work- and job-order processing and scheduling
- Gift and grant tracking and processing

Executive, supervision, control processes

- Executive decision processes
- Personnel, financial, and budget control processes

User and customer support processes

- Student relations processes
- Alumni and donor relations processes
- Government relations processes

Total Cost Management Serves the Purpose of Performance Improvement

Few, if any, work processes exist whose outcome cannot be improved and whose costs cannot be reduced. Since the entire idea for total cost management, activity-based costing, and process-cost management originated in manufacturing, it may not always be obvious how to apply it to a college or university. What products are involved? Which specific services should be totally cost-managed? Because enhancing even a minor activity's performance improves the condition of the institution as a whole, analysis of selected, even unrelated, work processes can be valuable, as long as the institution's total mission is kept in mind.

To improve a process's or an activity's performance, one must know the appropriate performance measures. Sometimes the measure is the cost per se. If reducing the cost does not affect the quality of the service adversely or to an unacceptable degree, reduced costs mean improved performance. Many higher education activity- and process-performance issues are complex and involve intangibles and quality issues that are not always easy to quantify. When activities and processes have both a cost and a revenue dimension—for instance, the process of achieving or exceeding the budgeted annual alumni operating gift goal—lower activity or processing costs should not result in fewer than the budgeted gifts from alumni. It is therefore essential that each total cost management task be based first on a precise definition of the objectives each process is expected to achieve; the definition of the process itself is a subordinate issue.

Most of the processes listed above are conceived broadly. More often than not they involve numerous independently managed entities within the institution. In sharp contrast, NACUBO's *Process Costing Workbook* exclusively singles out such narrowly defined activities as student applications processing, grade reporting, purchase requisitioning and ordering, invoice paying, new employee hiring, and grant seeking. Total cost management embraces both narrow and broad-based approaches. The for-profit literature on total cost management, activity-based costing, and process costing, highlighted for example in the *Ernst & Young Guide to Total Cost Management* increasingly takes the broader view.[3] Below, both dimensions will be explored.

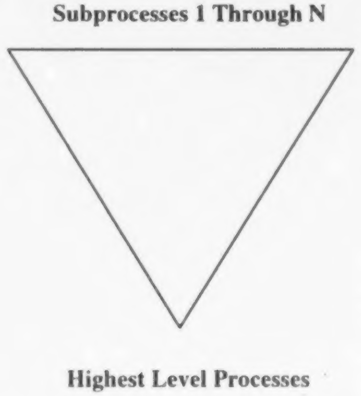
How to Implement Total Cost Management

Unless managers are familiar with activity and process costing, it is probably best if an institution begins with a pilot demonstration project. Complex pilot projects may require the use of an expert consultant. When in-house expertise is available, several projects might be started at once in different departments or decision areas. At some point, an institution should consider developing a long-range total cost management plan. Even if higher education will not soon adapt total cost management on an institutionwide basis, especially in very large and complex institutions and in university systems, the virtue of any total cost management plan is that it articulates where its costing tools could be valuable. Even case-by-case applications in key areas can contribute to significantly improved financial or quality results.

Description of a Typical Business Process

Normal full-scale business processes involve managerial and costing decisions that can be described by arranging them in the form of an inverted pyramid, where one's understanding of the basic or highest-level process depends upon a clear grasp of the underlying subprocesses as shown in figure 7.1. The inverted pyramid can be seen as a funnel where successive sub-processes converge and eventually flow together, becoming the primary or highest-level process. In the Ernst & Young guide, Michael R. Ostrenga and his co-authors provide what they call "the high-level process of managing materials" as an example of a full business process.[4] The example is germane for higher education, since materials and materials management generate significant costs throughout the industry.

Figure 7.1: Structure of a Broad-Based Business Process



Note: This inverted pyramid should be viewed as a funnel that allows activities and subprocess costs to flow down and accumulate into the total costs of the highest level processes.

For any given process, the number and sequence of subprocesses and, within each process, of distinct activities, is usually unique (e.g., institution-specific). There may not be a best solution, but in all likelihood there is a better one.

The Materials Management Process

Processes tend to cut across administrative functions. Sometimes processes are so decentralized that it may be difficult to grasp their interconnectedness. The very purpose of process and activity analysis is for managers to visualize the flow, from beginning to end, of interconnected activities. This is accomplished best by creating a process map that identifies each distinct activity as a chain of activity points. In a process as complex as materials management, several key subprocesses exist whose proper reciprocal integration is fundamental in total cost management.

If materials management is the principal or high-level process, what are these subprocesses? The following list, suggested in the Ernst & Young guide, provides at least a partial answer:[5]

- Choosing of the material to be acquired
  - Who makes the decision, and how is the choice made among competing materials?
- Vendor identification
- Purchasing-contract term negotiation
- Materials ordering
- Materials receiving

To these can be added subsequently the following:

- Materials inventory management
- Maintenance, security, and control (perishable materials require special attention and facilities; inventories shrink as a result of theft, weather-caused damage, etc.)
- Materials disposition (sale, scrapping, disposal of unused or damaged materials, returns to vendors)

As the guide notes, all of these subprocesses or activities cut across functions.

Additional subprocesses are materials inspection, materials acceptance or rejection, materials storage, materials inventory reporting (today normally in the form of computer-based materials catalogs), materials scrapping or liquidation, and for used materials, materials removal from storage or, under just-in-time production or servicing, bringing materials to user sites, followed by materials usage monitoring.

Each process has inputs and outputs. Materials ordering has such inputs as materials requisitioning and lists of approved vendors. The department of production planning may supply the materials requisition, and the purchasing department may provide the list of vendors. The purchase order is the subprocess's output. The Ernst & Young guide concludes its description of the materials management process by citing five so-called transforming activities that translate the inputs into outputs:

- Materials and purchaser specifications
- Vendor bids
- Vendor selection
- Purchase order issuance
- Follow-up activities with vendors

At large universities, and especially for all institutions in the public sector, each one of these activities may tend to be a complex undertaking. For instance, materials specification may involve negotiations among several departments or individuals, and input from experts inside or outside the institution may be required for technically sophisticated materials. There may exist a general or detailed description of the vendor bidding and selection processes that is imposed by law or government regulation, and the purchase order issuance process all too often may be enmeshed in red tape. While the often complex procedures impart a sense that "things are under control," they also testify to the specific mind set within the institution that governs operational decision making.

Managerial personalities and styles aside, however, the Ernst & Young guide clearly emphasizes the fact that even relatively mundane processes tend to be complex in their own right.

The Process of Managing the Purchase Requisition and Order

Now compare the preceding comprehensive or high-level process description with how NACUBO's *Process Costing Workbook* approaches the issue.[6] Here, the purchase-requisition process is seen as the principal process rather than as a subprocess in a more comprehensive total cost management situation.

The workbook offers the following definition for the purchase requisition–purchase order process:

> The purchase requisition and order process encompasses all the activities necessary to request and order an item(s). Depending upon the institution and the value of the item, the process may include approvals of the requisition and order, and competitive bidding. The...process leads to (but does not include) the receipt, delivery, and payment processes.[7]

This is clearly a subprocess of materials processing. The purchase requisition and purchase order process is described as going through the following extensive, somewhat bureaucratic, steps:

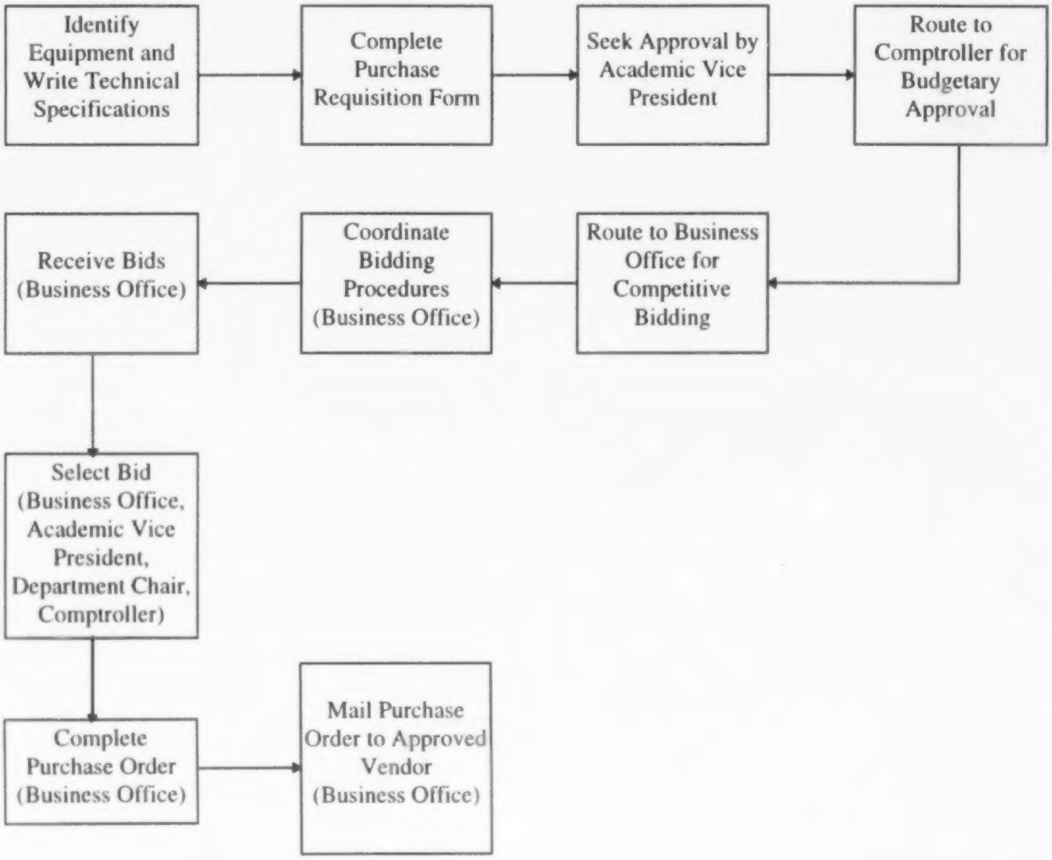
- Collect supporting information (in the Ernst & Young guide, a subprocess in its own right)
- Complete, type, and review purchase requisition (in some institutions this is a sub -process)
- Approve purchase requisition and again verify accuracy (the approval process may involve several such sign-off steps depending on complexity of organization)
- Review accounting codes, correct errors, and enter into appropriate accounting system
- Prepare and issue bid package and specifications
- Receive and review bids, notify bidders
- Create purchase order
- Place order
- Update purchase requisition form, enter data in accounting system, print hard copy of purchase order
- File all documents related to the purchase requisition and purchase order, file bid package, file reasons for choice of vendor, etc.

This example demonstrates well that one can look at the purchase order process in more than one way. For routine purchases of supplies and even equipment, the item's specifications, accepted vendors, and bidding processes will have been established well before a purchase requisition will ever be produced. The specific sequence of steps in a process where nonroutine purchases are contemplated (the acquisition of an electron-microscope, a new boiler for the power plant, the creation of a personal computer network for administrators) is more in the nature of sets of ad hoc processes designed clearly for such specific purposes.

The Ubiquitous Process Flow Chart

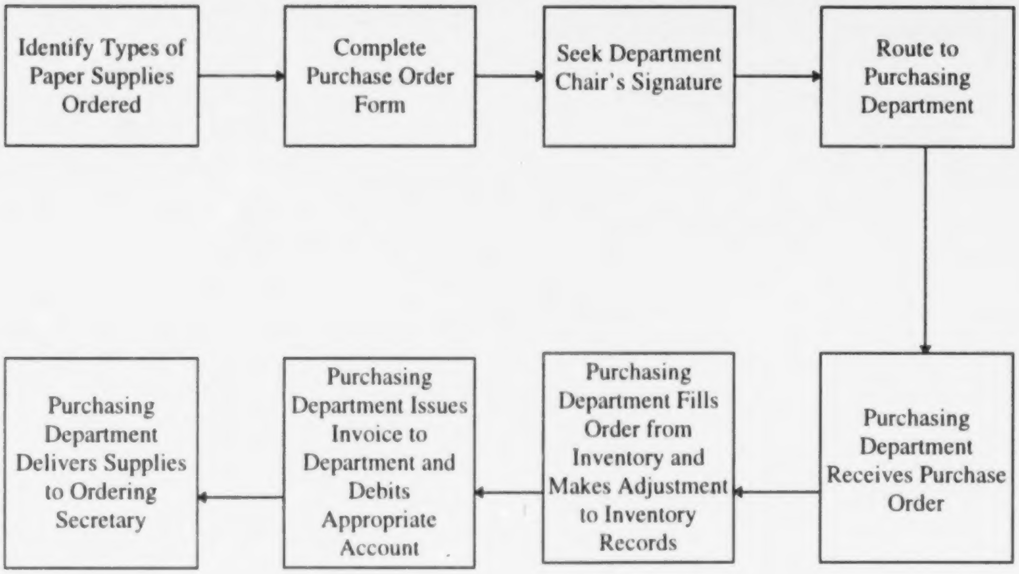
The workbook, like most texts on the subject, recommends that managers describe each process by means of an activities flowchart. Figures 7.2 and 7.3 illustrate this concept by choosing arbitrarily a few steps in the process that ends with the purchase order. Of course, a simple truly sequential listing of the steps will serve just as well.

Figure 7.2: Sample Flow Chart Sequence in Purchase Requisition and Order Process


Identify Equipment and Write Technical Specifications
Complete Purchase Requisition Form
Seek Approval by Academic Vice President
Route to Comptroller for Budgetary Approval
Route to Business Office for Competitive Bidding
Coordinate Bidding Procedures (Business Office)
Receive Bids (Business Office)
Select Bid (Business Office, Academic Vice President, Department Chair, Comptroller)
Complete Purchase Order (Business Office)
Mail Purchase Order to Approved Vendor (Business Office)

Note: This example assumes that the purchase requisition and the purchase order are two distinct documents.

Figure 7.3: Alternate Flow Chart Sequence in Purchase Requisition and Order Process


Identify Types of Paper Supplies Ordered
Complete Purchase Order Form
Seek Department Chair's Signature
Route to Purchasing Department
Purchasing Department Receives Purchase Order
Purchasing Department Fills Order from Inventory and Makes Adjustment to Inventory Records
Purchasing Department Issues Invoice to Department and Debits Appropriate Account
Purchasing Department Delivers Supplies to Ordering Secretary

Note: If paper supplies are not in inventory, placing an order with an external vendor can add several additional process steps.

The first illustration assumes that the institution uses a separate purchase requisition form before it creates the related purchase order. Figure 7.3 assumes that no separate requisition form is needed. Thus there is an immediate difference in the costs involved. Once the requisition has been approved, it becomes the official purchase order. Liberal Arts College uses both approaches depending upon the type of item ordered.

Both illustrations make another point: Depending upon the type or dollar amount of a given purchase, the signing-off authority may be lower or higher up on the organization chart. Purchase requisition sign-off may reach as high as the chief executive office or may end with a department head. There is absolutely no uniformity either within an institution or among institutions on how the process is organized.

The key is to determine, first, how many separate activities there are in a given process; second, who is carrying out each activity; third, how long it takes to accomplish the task in question; and fourth, what other than personnel resources are required in each case. Process and activity analyses are almost always linked with costing, and in this context, cost analysis will always inquire into alternative uses of resources. The flowchart or sequential list of activities within a given process is, therefore, the foundation on which process costing must be built.

The workbook's and the guide's descriptions of a single business process have similarities and differences. In both, each process is made up of two or more separate activities. In some institutions, and for some materials acquisitions, a single individual may be responsible for several activities; in more complex situations, several employees, departments, and jurisdictions may be involved. But, the guide takes a more enterprise-centered view, whereas the workbook focuses mainly on the subprocess. From the perspective of today's literature on total cost management, the guide provides a state-of-the-art description of the concept; for higher education, the workbook suggests applications that may appeal to colleges and universities that have not already studied and streamlined their most costly bureaucratic processes.

The Costs of Processes and Activities: Some General Observations

Process and activity costing in higher education impose on practitioners from other than an educational environment the responsibility to understand some of the special constraints that managing colleges and universities entail. Since the overall management effort (monetary constraints aside) is focused on qualitative issues, those who advocate the use of a methodology inherited and imported from manufacturing carry the burden of proof. At the same time, it is reasonable to suggest to those who apply process-cost analysis in higher education that, with proper care and adaptation, many industrial models can be used in their field. In addition to these cautions, a few pitfalls and concerns of a general nature are worth mentioning here.

Time As a Factor

Normally, an important objective is to reduce the time a process takes. This consideration must be distinguished from the time a given employee is involved in an activity. Another perspective is that of those who ask how long one has to wait for results, services, and reports, and how well they are executed. An activity map or flowchart is in effect a picture of a queuing situation. By itself, it does not address time that may be wasted on and between activities. Queues imply that activities are ordered sequentially. Long and complex queues can lead to bottlenecks where activities accumulate, thus lengthening the waiting time at subsequent activity points. Reducing the complexity of the chain of activity points may reduce costs as bottlenecks are eliminated. It is almost always sound practice to reduce bottlenecks, eliminate backups, and speed up activity delivery, unless these result in sharp cost increases. Sometimes the benefit reaped from high customer satisfaction may outweigh increases in the cost of the activity that produces the favorable service result. Thus, time is a most important factor affecting process and activity costs.

Total Process Costs

The literature on process and activity costing does not always focus on their total or full cost, but tends to single out labor costs as most important. On this subject, the *Process Costing Workbook* emphasizes labor costs at the exclusion of other costs. This is unfortunate, since all processes involve a combination of personnel or labor, consumables, and capital costs. Moreover, when process- and activity-cost analysis calls for a reduction in labor costs, often a substitution of non-labor costs results.

Materials requisition and purchase order processing is a case in point. This and other similar activities were essentially centered on sending pieces of paper from one point to another on the process assembly line (requiring multiple-copy, color-coded forms to be recorded, filed, mailed or hand-carried from one office to the next or, in complex systems, from one campus to another, and then often returned to the originators, sometimes with stopovers in between). Today, many processes are becoming essentially paperless. From the point of view of costing, this means a change in the composition of the factors of production and thus of the cost elements proper. Today, every process and activity described in the *Process Costing Workbook* is being transformed from a paper-centered system into an increasingly paperless system, a transformation which is sometimes a direct outcome of process- and activity-cost analysis.

Therefore, it is essential that those interested in and charged with process and activity costing focus on total costs: personnel, consumables, and capital costs. In many modern, increasingly paperless processes, the share of direct labor costs will tend to decline, whereas the share of nonlabor costs may rise.

For instance, in a highly streamlined and essentially paperless purchase requisition and order system, labor costs may in fact be less than the combined materials, inventory, record storage, and computer (or capital) costs. In terms of the changing cost structure, this means that by moving to a paperless system or as a result of process- and activity-cost analysis generally, variable costs may be replaced by fixed costs.

Process streamlining, simplification, and outright optimization require changing the process- and activity-cost mix. Without a change in the structure of a process, cost reductions may be modest. Significant and lasting cost reductions require significant changes in the process proper, that is, in the way business is done. The changes that will have the heaviest impact on costs (e.g., those that reduce them the most) are also perceived frequently as too revolutionary, and this brings up the next general issue.

Personnel Cost, Process-Time Studies, and Illusory Substitution Effects

A central feature of process-cost analysis is the quantification of the time spent by employees on the specific tasks or activities highlighted in process- and activity-cost worksheets. Unless a computer-based time analysis exists that records log-on and log-off times when a process transaction takes place, the time-elapsed record must be assembled by such means as surveys or interviews, employee logs or diaries, or time cards.

Anyone familiar with the history of time-and-motion studies knows of their unpopularity with employees. Experience with early faculty work-load studies also suggests that, unless special care is taken, hours of work claimed by employees may not be the same as hours of work actually done. Time-elapsed reports must not only be credible to managers, but also to employees. Since one of the objectives in process-cost studies is to reduce both the time spent on a task and the number of tasks, employees may be inclined to perceive process-cost analysis as a threat. They may have strong incentives to slant time reports in their favor by underestimating how much time a specific activity consumes. This is especially true in the types of bureaucratic processes to which the *Process Costing Workbook* is devoted.

It is also worth asking what kinds of specific time-in-the-process inquiries make sense. Since higher education processes are often quite complex, does it make sense to ask or determine for everyone involved how much time, minus meal- and break-times, they spend on a given task, as the *Process Costing Workbook* suggests? It is, of course true, that, ideally, one cannot determine the full and true cost of a process or activity without considering total labor or personnel costs. On the other hand, almost every process, even the relatively simple ones described in the workbook, will involve individuals who will not be fired, even if the whole process is eliminated. For instance, how important is the inclusion of the university comptroller's time-weighted compensation cost in the determination of the purchase requisition and order processing cost? Or, how should the personnel compensation cost of an admissions officer with multiple duties be treated in the processing of a prospective student's application for admission? Or, still more fascinating, what about the chief executive's time when he or she attends enrollment management meetings or must resolve disputed admissions decisions—activities which in most colleges and universities are part of the broader admissions process?

The point of these questions is to suggest that the costing of many processes and activities should not be carried to extremes, but might focus principally on the cost and process elements that can actually be changed. In addition, it is worth considering in advance of designing a process-cost system the kinds of cost substitutions that are politically feasible. Certain processes involve tenured faculty and other permanent staff positions, and the cost of their time involvement in the process can be significant and could exceed the direct cost of the type of nontenured personnel involved in the process.

Many primary and support academic processes could exist at less cost if cost actually determined their existence. Even if process and activity costing leads to a new process that costs less, there is no guarantee that the institution's total costs will be affected in any way. Once a particular process-cost analysis suggests that labor-based activities and other costs should be eliminated or their scope reduced, what happens next? It cannot be assumed that total institutional costs would now be reduced, however desirable this might be. Even if a faculty-based process, of which there are many, is streamlined, does this mean that fewer faculty will be hired? In the more complex processes, especially those requiring governing board and faculty participation and decisions, process costs embrace a spectrum of process participants who seem to be especially immune to retrenchments induced by process-cost analysis. It is not surprising that colleges and universities will be more interested in analyzing first the more mechanical processes before they institute a comprehensive system of cost analysis involving the types of complex processes listed above.

Cost and Revenue Dimensions in Process Costing

Finally, it is worth noting that the expression "process costing" is misleading in circumstances where the process involves the production of current and long-term revenues and capital. Here, higher education differs the most from a normal for-profit enterprise, where the overwhelming source of current revenue is through the sale of a product or service and where the creation of capital depends upon the enterprise's long-range profit outlook.

College and university processes where the production of revenues is the primary objective include the following:

- All work processes and activities devoted to the production of student tuition and fees, room and board, and other student-based revenues
- Processes designed to produce revenues and capital for the subsidization of students through fellowships, scholarships, and prize grants, as well as for assisting students by providing loan funds
- Processes and activities designed to raise operating gifts and grants, as well as new capital for physical facilities and endowment
- All formal processes intended to generate gifts, grants, and indirect-cost-recovery revenues for the institutions formal research efforts

All of these processes are quite complex and encompass numerous subprocesses and many different types of specific activities. While costs matter, the principal objective is the revenue target which the process is expected to achieve. Therefore, for process management to be successful, process costs must always be weighed against the institution's short- and long-term revenue targets.

These caveats not withstanding, managers can benefit from knowing about the costs of both complex and simple processes. Even full process costs (tier four in the FTFC model) may be useful if management wants to know how processes consume the institution's total resources. But the greatest benefit may lie in discovering the direct costs of sequential processes that are repetitive and consume significant amounts of an institution's time and resources. The remainder of this chapter will illustrate process costing and describe summary report formats readers may find useful.

Applying the FTFC Model to Process and Activity Costing

As in all management and resource allocation issues, asking the right questions goes a long way toward finding the most appropriate answers. Costing is no exception to this rule.

Materials Management Decisions and the Changing Cost Mix

Materials management offers a classic example of how computer technology has changed the way business is done. Point-of-sale inventory control, ordering, and delivery are taken for granted in for-profit enterprises. Point-of-use inventory control, ordering, and delivery are increasingly being used in higher education, but are not nearly as well developed as they are in the for-profit sector. Materials handling at most colleges and universities, especially when it is highly decentralized, remains rather primitive when compared to practices in the for-profit sector.

In its most simplistic form, materials handling involves what must be ordered, when, by whom, and on whose approval. Managers must ask the following questions:

- What materials are being requested?
- Are they the right kinds of materials?
- Are they acquired at the best prices?
- Are there different processes for different types of materials?
- Are specific activities directly related to the value of acquisitions?
- How automated is the acquisitions process?
- Are materials management and purchase requisition–purchase order processes based on an optimal materials acquisition model, highlighting the trade-off between costs and materials and service quality?
- What are the natural costs of each activity shown in the process flowchart? in the materials management process? in the purchase requisition–purchase order process?
- Is the purchase requisition–purchase order process properly integrated with the broader materials-acquisition process?
- Are materials available to users when they need them?
- What are the lead times between placing an order and materials delivery?
- Is there a just-in-time methodology underlying the materials process?
- Does the institution have formal optimal inventory cost policies? How are these integrated into materials management and, more specifically, into the purchase requisition–purchase order process?
- How are inventories financed?[8]

The importance for cost management is that the answers to these types of questions will eventually determine the nature and scope of the materials handling process and thus will also determine its costs.

Liberal Arts College has developed a process- and activity-cost matrix that mirrors the natural cost chart of accounts shown in chapter 6. Figure 7.4 shows a hypothetical cost configuration before the process analysis. Figure 7.5 shows the configuration after a significant change in the process. The difference between the two cost setups is the shift from a paper-intensive to a paperless process, which shifts costs principally from personnel to consumables and capital cost lines. Figure 7.6 illustrates how activity cost can be recorded. Costs in figure 7.5 are lower than those in figure 7.4.

In order to come up with the data in the two exhibits, pre- and post-change activity-cost worksheets had to be prepared. While these worksheets are conceptually similar to those offered in the *Process Costing Workbook*, their format is different in that it emulates a typical computer spreadsheet. This way, the activity-cost worksheets are fully integrated with the cost accounting system and all costs can be downloaded from the appropriate accounts to the worksheets. Figures 7.7 and 7.8 provide an example.

Figure 7.4: Selected Materials Process Activity Costs at Liberal Arts College Before Change In Process

Activity in Process	Total Personnel Compensation	Total Consumables Costs	Total Tier-One Costs	Tier-Two Through Tier-Four Costs	Total Costs
Type Purchase Requisition Form	$3.25	$0.85	$4.10	$0.00	$4.10
OK by Department Chair	0.25	0.00	0.25	0.00	0.25
Send to Academic Vice President	1.75	0.00	1.75	0.00	1.75
Academic Vice President Approval	2.75	0.00	2.75	0.00	2.75
Send to Comptroller	1.75	0.00	1.75	0.00	1.75
Comptroller Approval	1.10	0.0	1.10	1.15	2.25
Send to Business Office	1.75	0.00	1.75	0.00	1.75
Business Office Initiates Bidding	5.85	1.01	6.86	0.00	6.86
Total This Phase	18.45	1.87	20.32	1.15	21.47

Figure 7.5: Selected Materials Process Activity Costs After Change in Process

Activity in Paperless Process	Total Personnel Compensation	Total Consumables Costs (Computer)	Total Tier-One Costs	Tier-Two Through Tier-Four Costs	Total Costs
Enter Purchase Requisition Computer	$2.95	$0.55	$3.50	$0.00	$3.50
Enter Approval by Vice President	0.25	0.05	0.30	0.00	0.30
Enter Approval by Comptroller	0.25	0.05	0.30	0.00	0.30
Initiate Bidding	5.85	0.00	5.85	0.00	5.85
Depreciation Allowance	0.00	0.00	0.00	1.25	1.25
Total This Phase	9.30	0.65	9.95	1.25	11.20

Note: The dollar figures are arbitrary. The computer-based purchase requisition form has special fields for the required approvals.

Figure 7.6: Activity-Cost Worksheet

Activity	Employee and Position	Time Used (Hours)	Hourly Equivalent of Compensation	Cost of Activity
Write Specification	Assistant Business Manager	0.50	$8.56	$4.28
Fill Out Requisition	Clerical Employee	0.07	2.23	0.16
Type Purchase Order	Clerical Employee	0.08	2.38	0.19
Total Activity				4.63

Note: This illustration focuses on payroll costs only.

Figure 7.7: Summary Process Spreadsheet

Cost Centers	Activity One	Activity Two	Activity Three	Activity Four	Activity Five	Activity Six	Activities ……	Activity N	Sum of Activities
Personnel Compensation									
Salaries or Wages									
Staff Benefits									
Professional Services									
Subtotal									
Consumables									
Travel									
Transportation									
Meals									
Lodging									
Other									
Entertainment									
Supplies									
Utilities									
Repair and Replacement									
Computer Services Prorated									
All Other									
Subtotal									
Total Tier One									
Long-Term Debt									
Total Tier Two									
One-Year Assets									
Total Tier Three									
Depreciation									
Total Tier Four*									

* Before transfers and other changes.

Figure 7.8: Activity Spreadsheet

Cost Centers	Employee One	Employee Two	Employee Three	Employee Four	Employee Five	Employee Six	Employees	Employee N	Sum of Employees
Personnel Compensation									
Salaries or Wages									
Staff Benefits									
Professional Services									
Subtotal									
Consumables									
Travel									
Transportation									
Meals									
Lodging									
Other									
Entertainment									
Supplies									
Utilities									
Repair and Replacement									
Computer Services Prorated									
All Other									
Subtotal									
Total Tier One									
Long-Term Debt									
Total Tier Two									
One-Year Assets									
Total Tier Three									
Depreciation									
Total Tier Four*									

* Before transfers and other changes.

The activity spreadsheet accounts for the costs generated by each employee involved in the activity. The process spreadsheet represents the sum of the costs of all the activities. The emphasis in these and subsequent illustrations is not on the accuracy of the process proper and its underlying activities, but on how process and activity costs might be reported.

The Enrollment Management Process at Liberal Arts College

Liberal Arts College chose the expression "enrollment management" deliberately: It perceives that admitting new students is more than an admissions issue, but also encompasses the production of student revenues, managing student aid, and creating a curriculum and teaching activities that ensure a continuing demand from prospective students for the institution's services. While Liberal Arts College continues to operate within established administrative functions, most of its decisions about new-student admissions involve significant human and material resources that are not part of the decision purview of the admissions department proper.

The enrollment management process is inter-departmental, and its costs are not limited to one department's budget. Figure 7.9 lists many of the principal participants. The diagram focuses on participants who either spend most of their professional time and resources in a complex set of subprocesses, or who, while spending less time, are involved in crucial decisions at key points in the process.

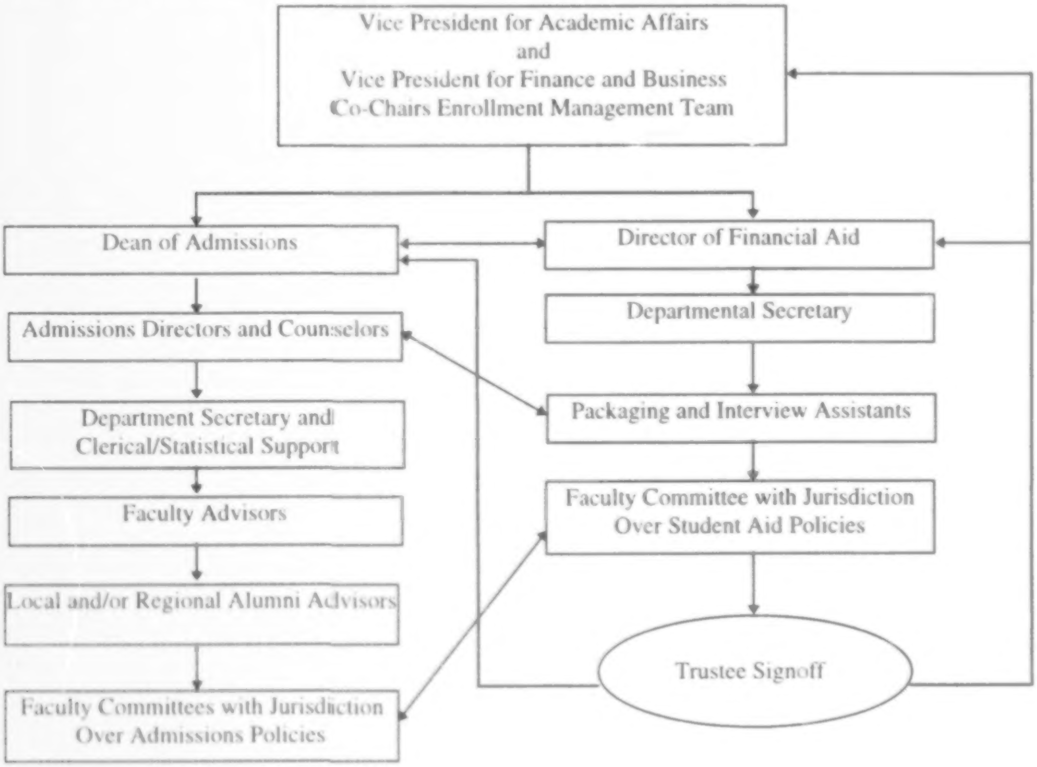
Enrollment management at Liberal Arts College is under the co-direction of the vice presidents for academic affairs and for finance and business. They jointly chair a management team composed of the dean of undergraduate admissions, the dean of students, the director of student financial aid, the faculty chair of the curriculum committee, the director of off-campus programs, and a high-ranking employee responsible for maintaining accurate statistics pertaining to the team's operating-data requirements.

The management team meets at least once a month to determine admissions management policies and targets, and during the applications influx, meets every two weeks. Normally, the meetings last 30 minutes to an hour. When the need calls for it, other members of the administration attend. The vice president for academic affairs is the liaison to the faculty's Admissions Committee, which approves all final admissions offers, and the faculty's Student Grants and Fellowships Committee, which must approve all student aid packages.

From time to time, the faculty's Curriculum and Admissions Committees discuss curricular matters, admissions, and graduation requirements, and they may make recommendations to the faculty for changes that would affect the volume of matriculations. The faculty as a whole formulates broad academic admissions criteria and controls the SAT and ACT cutoff points.

The principal task of the enrollment management team is to supervise the admissions and student aid efforts, to monitor their progress, and to propose and implement short-range changes when necessary. The team also recommends admissions goals to the president and faculty and suggests changes in admissions and student aid policies to the appropriate bodies.

Figure 7.9: Participants in the Enrollment Management Process at Liberal Arts College


Vice President for Academic Affairs
and
Vice President for Finance and Business
Co-Chairs Enrollment Management Team
Dean of Admissions
Director of Financial Aid
Admissions Directors and Counselors
Departmental Secretary
Department Secretary and
Clerical/Statistical Support
Packaging and Interview Assistants
Faculty Advisors
Faculty Committee with Jurisdiction
Over Student Aid Policies
Local and/or Regional Alumni Advisors
Trustee Signoff
Faculty Committees with Jurisdiction
Over Admissions Policies

The periodic meetings of the team are structured in the following manner:

1. A statistical status report is presented.
2. The dean of admissions presents a forecast of likely matriculations.
3. The dean of students reports on prospective housing occupancies under this forecast.
4. The director of financial aid presents an updated report on how financial aid, especially grants, are distributed and the effect this may have on net tuition revenues, if the admissions forecast is correct, and on the SAT and ACT distribution of admitted students.
5. The vice president for finance and business evaluates these forecasts from the institution's overall budget perspective, specifically updating the new-student net revenue model, which arrays the financial data on an SAT and ACT quality scale.
6. A discussion follows: If corrective actions are needed, they are put forth, discussed, and decided (unless other groups or individuals must sign off first), and specific work assignments may be made.

The president of the college attends these meetings on occasion and whenever especially troublesome developments require the chief executive's presence, input, or sign off. Thus, rather than serving only to brief another committee, this is a true management team with decision-making authority. Obviously, the process is complex and in certain phases, very cumbersome.

Major Subprocesses

In terms of total cost management, and management team meetings aside, this enrollment management effort distinguishes among the following major subprocesses:

- The admissions process (figure 7.10)
- The student aid process
- The curriculum development process

The Admissions Process

The normal admissions process at Liberal Arts College is divided into four major segments:

- Planning: planning and trustee approval
- Operations: preparation
- Operations: responding to inquiries and creating an applicant pool
- Operations: creating a pool of matriculants

Figure 7.10 sketches many of the activities that are an integral part of this process. The chain of activities highlighted applies to an institution with modified rolling admissions, but can be adapted easily to other admissions modes. Admissions processes are seldom if ever linear, as an activities map might imply. Instead, they are back-and-forth iterations as individual applications are received, the numbers change, and management adjusts admissions activities in response to changing market events. Within the admissions department, admissions counselors are assigned to individual applicants and stay with the applicant through matriculation and often beyond.

Liberal Arts College likes to be known for the personal touch its staff brings to the total admissions task. This means that the total enrollment management process is not easily amenable to the types of quantitative analyses and changes implied in the simpler, more mechanistic new-student admissions process illustrated in the *Process Costing Workbook*.

This can be shown by means of an abbreviated adaptation of the workbook's original flowchart in figure 7.11.

The workbook's flowchart includes several activity points that are full-fledged subprocesses in their own right. At Liberal Arts College, applicant interviews, evaluations, and the official decision to admit or to reject involve more than one decision maker and inputs from multiple institutional sources and include feedback loops where the employees involved must re-communicate with applicants repeatedly (figure 7.11) Until an admitted applicant is actually on campus registering for courses, the process is not truly complete. Institutions may differ in how intensively they cultivate (or, must cultivate) potential matriculants, but all enrollment management processes have in common their lack of linearity.

Figure 7.10: Activities in New-Student Enrollment Management Process at Liberal Arts College

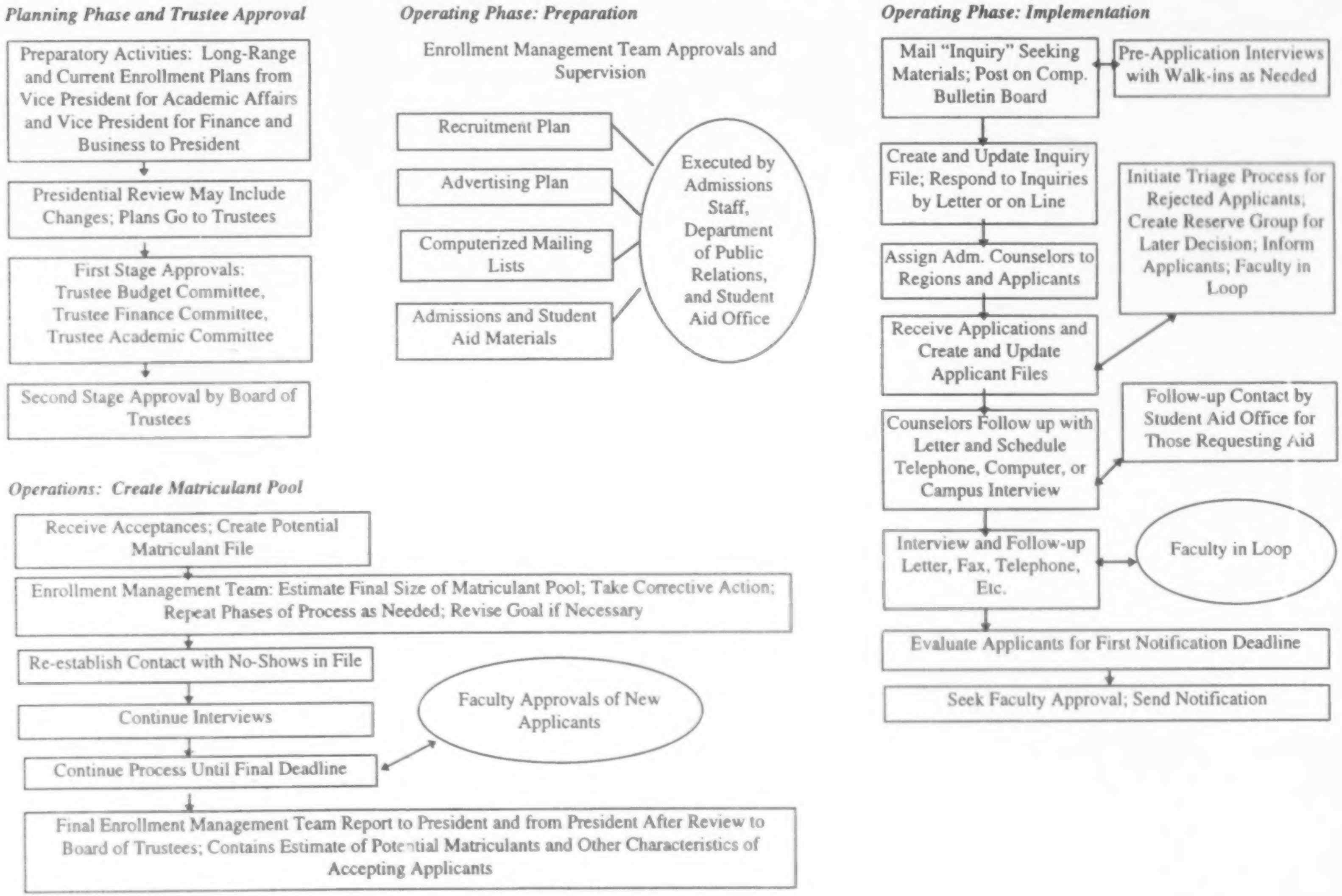
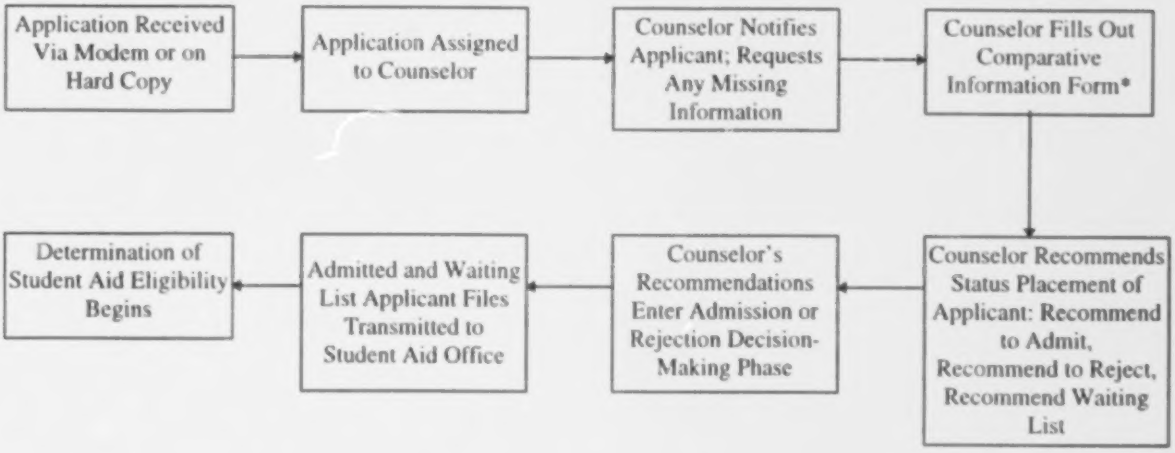

Planning Phase and Trustee Approval
Preparatory Activities: Long-Range and Current Enrollment Plans from Vice President for Academic Affairs and Vice President for Finance and Business to President
Presidential Review May Include Changes; Plans Go to Trustees
First Stage Approvals: Trustee Budget Committee, Trustee Finance Committee, Trustee Academic Committee
Second Stage Approval by Board of Trustees
Operating Phase: Preparation
Enrollment Management Team Approvals and Supervision
Recruitment Plan
Advertising Plan
Computerized Mailing Lists
Admissions and Student Aid Materials
Executed by Admissions Staff, Department of Public Relations, and Student Aid Office
Operating Phase: Implementation
Mail "Inquiry" Seeking Materials; Post on Comp. Bulletin Board
Pre-Application Interviews with Walk-ins as Needed
Create and Update Inquiry File; Respond to Inquiries by Letter or on Line
Initiate Triage Process for Rejected Applicants; Create Reserve Group for Later Decision; Inform Applicants; Faculty in Loop
Assign Adm. Counselors to Regions and Applicants
Receive Applications and Create and Update Applicant Files
Counselors Follow up with Letter and Schedule Telephone, Computer, or Campus Interview
Follow-up Contact by Student Aid Office for Those Requesting Aid
Interview and Follow-up Letter, Fax, Telephone, Etc.
Faculty in Loop
Evaluate Applicants for First Notification Deadline
Seek Faculty Approval; Send Notification
Operations: Create Matriculant Pool
Receive Acceptances; Create Potential Matriculant File
Enrollment Management Team: Estimate Final Size of Matriculant Pool; Take Corrective Action; Repeat Phases of Process as Needed; Revise Goal if Necessary
Re-establish Contact with No-Shows in File
Continue Interviews
Faculty Approvals of New Applicants
Continue Process Until Final Deadline
Final Enrollment Management Team Report to President and from President After Review to Board of Trustees; Contains Estimate of Potential Matriculants and Other Characteristics of Accepting Applicants

Figure 7.11: Segment of Student Admissions Application Process Flow at Liberal Arts College


Application Received Via Modem or on Hard Copy
Application Assigned to Counselor
Counselor Notifies Applicant; Requests Any Missing Information
Counselor Fills Out Comparative Information Form*
Counselor Recommends Status Placement of Applicant: Recommend to Admit, Recommend to Reject, Recommend Waiting List
Counselor's Recommendations Enter Admission or Rejection Decision-Making Phase
Admitted and Waiting List Applicant Files Transmitted to Student Aid Office
Determination of Student Aid Eligibility Begins

* A special form exists that lists horizontally the name of each student for whom the counselor is responsible, and vertically a lengthy series of demographic and quality indicators for which points are given, summing to a total admissions profile score.

Neither the workbook's nor Liberal Arts College's admissions processes are paperless. Liberal Arts College, however, has recently instituted several major changes whereby applicants can access an Internet site, download important information and application forms for admission and student aid, and submit basic applicant data electronically, via modem or by fax directly to the college's admissions office. All prospective students are encouraged to use the computer-centered service, and the application fee is waived for those who do. But the institution remains sensitive to those who prefer the old-fashioned method.

Eliminating activity points in the activities chain of a process is an obvious way to reduce total processing costs. For instance, in the case of Liberal Arts College, eliminating the batch-processing phase of periodic faculty committee approvals would reduce both the time consumed and the direct faculty costs that would be assigned to process costs. Of course, the change would not reduce the institution's total cost, since in all likelihood no faculty personnel would be fired. Liberal Arts College's move toward a more computer-centered applications approach changes the cost structure, since the cost of capital must now be taken into account. Even here it is doubtful that total costs will be less in the short-run; any new capital investment could increase costs. The major point made here is that changes can or will take place in the process-cost structure when the process proper is changed.

Perhaps the most serious weakness inherent in process costing is the fact that, at least in the case of such processes as admissions, student aid packaging, and employee hiring, the purely mechanistic chain of activities (e.g., the routing of the relevant forms or information) is but a minor aspect of the work that needs to be performed. The time- and cost-consuming elements concern the many human, often-convoluted interactions without which the final outcome is not possible. Enrollment process analysis must take into account the zigzag nature of the sequence of interactions between institutional personnel and individual applicants.

Even within the limits of the more mechanistic aspects of the admissions process, where the focus is on describing and streamlining the paperwork and information flow, it is safe to assume that some applications take longer to process than others for a variety of reasons (e.g., degrees of completeness, accuracy, differences in legibility, a student's qualifications, and the required reviews by staff). More to the point, the time it takes to process an application cannot be known in advance. Processing student applications is not like posting checks to an account by a bank clerk. Over time, managers may acquire a statistical profile of their institution's time-weighted admissions information flow, a profile which then becomes part of the process analysis.

A case could be made that processes which depend on repeated qualitative decisions, such as the new-student admissions process, are inappropriate subjects for meaningful process- and activity-cost analysis. Too many activity points, even in relatively mechanistic processes, are complex subprocesses in their own right. And because many activities cut across several jurisdictions, measuring and assigning the myriad personnel costs involved can become very problematic. The Liberal Arts College flowcharts (figure 7.10 and 7.11) should make this quite clear.

Nevertheless, there is great potential benefit in persevering. First, process analysis helps bring into focus who is engaged in what specific activities and for what purpose. The mere fact that such self-study takes place may disclose unnecessary or overlooked activities, and may subsequently lead to a more effective process. Second, however difficult or problematic specific process- and activity-costing aspects may be, understanding at least the direct costs of simple and complex processes will assist in bringing about a better allocation of future resources. As will be shown next, relatively simple techniques make possible an understanding of the costs of such complex processes as that of new-student admissions.

Process and Activity Scenarios

Before any given process and activities map can be created, it is necessary to describe the activities scenario. This is akin to constructing a storyboard of what the employees involved are and have been doing (historical activities costs) or will be expected to do (planned or normative activities costs). In a general sense, an employee's job description is supposed to define the workscope, but what happens during a day, minute by minute, is seldom part of anyone's job description. The *Process Costing Workbook* illustrates time-worksheets for many types of activities within processes that employees are engaged in, suggesting that a proper process scenario and cost analysis depends on a minute-by-minute accounting of one's time spent on a high diversity of tasks (after deducting meals and work breaks). This time spent in an activity will be expressed as a percentage of the employee's total work load, and this percentage is then multiplied by the average wage, salary, or total compensation to calculate the labor cost equivalent of the activity.

At Liberal Arts College a significant percentage of an admissions counselor's work involves off-campus recruiting trips where he or she meets prospective applicants at home, in their schools, or at other designated points. This gives rise to large travel budgets, and there exists a vast management science literature that gives advice on managing the logistics of travel in cost-effective ways. Liberal Arts College also tries to train its staff to project a specific user-friendly style for communicating with potential applicants. The workscope for individual counselors falls short of dictating minute-by-minute tasks and behavior; the institution prefers to leave much to a counselor's initiative and intelligence. Thus, scenarios and storyboards are able to sketch out in detail the tasks that must be performed, but may not necessarily prescribe every detail of how an employee will spend his or her time.

How does one measure the success of enrollment management efforts? There is a cost-benefit dimension to enrollment management in general and to specific employees' tasks. The true cost-benefit dimension depends on asking the appropriate question concerning the benefits, and the answers may differ depending on which activity's performance is being evaluated. How many completed applications have been produced and can be attributed to a specific employee? How many of these applicants have been admitted? How many matriculations will eventually result from either an individual's, a team's, or the process's efforts? And how much budgetable cash flow will result from matriculating new students? Which type of question is the correct one? In the final analysis, only the last one highlights the ultimate financial payoff.

Finally, a last caveat: Institutions should guard against engaging in time-study overkill, in part for reasons mentioned earlier, and in part because process and activity costing engender their own costs. Some costing trips and costs they cause just may not be worth the trouble.

Activity-Based Costing of the Enrollment Management Process at Liberal Arts College

The following discussion centers on how Liberal Arts College accounts for its entire enrollment management process. In contrast to the conventional Admissions Department budget, an enrollment management responsibility center budget has been developed. The entire process has been subdivided further into a series of subprogram or responsibility budgets, each under the control of a specific manager. These budgets underwrite the new-student admissions process described in figure 7.10 and 7.11, give or take some activities. For instance, while there is a budget account for the applications approval process, there is no budget allocation at this time for individual faculty and faculty committee roles in enrollment management.

Figure 7.12 illustrates the difference between the conventional Admissions Department budget and the more comprehensive enrollment management budget.

The last column combines resources from several departments (admissions, student aid administration, public relations, registrar, computer center, business office, etc.) and summarizes a comprehensive and complex program budget.

Figure 7.13 dissects the last column of figure 7.12 and identifies major steps or subprograms in the overall enrollment management process. The designations in the first column are somewhat arbitrary and sum up activities that have common features. For the sake of this illustration, only broad activity categories are shown. Subsequent exhibits ferret out details. Horizontally, Figure 7.13 adheres to the FTFC model used throughout this book.

These data come from analyses (percentage distribution of tasks) of how individual employees spend their professional or work time and what kinds and amounts of other resources they use in the process.

Figure 7.12: Summary Comparison of the Traditional Admissions Department Budget and the New Enrollment Management Budget

Natural Costs	Admissions Department	Enrollment Management Program
Personnel	$708,039	$1,295,383
Consumables	1,180,101	1,008,252
Total Tier One	1,888,140	2,303,635
Long-Term Debt Costs	0	985
Total Tier Two	1,888,140	2,304,620
One-Year Assets	5,513	7,875
Total Tier Three	1,893,653	2,312,495
Depreciation	6,015	9,862
Total Tier Four	1,899,668	2,322,357

Figure 7.13: Liberal Arts College Total Activity-Based Costs for the Enrollment Management Process

Processes and Activities	Personnel	Consumables	Tier One	All Capital	Tier Four
Admissions					
Recruitment	$328,625	$915,621	$1,244,246	$0	$1,244,246
Applicant File	68,251	27,823	96,074	7,582	103,656
Approvals	32,247	6,258	38,505	116	38,621
Correspondence	92,521	26,299	118,820	2,274	121,094
Other	268,255	123,548	391,803	1,108	392,911
Subtotal	789,899	1,099,549	1,889,448	11,080	1,900,528
Financial Aid					
Application	16,922	11,298	28,220	4,228	32,448
Packaging	37,841	1,206	39,047	2,116	41,163
Approvals	18,922	521	19,443	89	19,532
Other	131,223	1,895	133,118	682	133,800
All Other	191,378	2,981	194,359	527	194,886
Subtotal	396,286	17,901	414,187	7,642	421,829
Total	1,186,185	1,117,450	2,303,635	18,722	2,322,357

Figure 7.14 concentrates on off-campus recruitment and provides cost details associated with this function. Here the emphasis is on tier-one consumables costs only, since capital costs had a value of zero in figure 7.13. Liberal Arts College's off-campus recruitment program is extensive and expensive.

The major cost components are personnel compensation and employee travel and entertainment. The remaining costs would spread across the natural-cost categories within the consumables group of costs described in detail in chapter 6. Not every employee engaged in enrollment management is involved in recruitment proper, and all employees involved in recruitment have other duties. The $48,275 of compensation for off-campus recruitment represents 61.24 percent of employee A's total compensation. The objective for figure 7.14 is to show the recruitment contribution to process costs of employees and certain other activities. Among consumables costs, only supplies and other costs are shown. Because the charge for computer services represents a mix of personnel and consumables costs, it is shown as an activity in the first column.

Figure 7.14: Off-Campus Recruitment Program Budget at Liberal Arts College

Employee or Activity	Compensation	Travel	Supplies, Telephone, Etc.	Other	Total Consumables	Total Tier One
Employee A	$49,257	$119,655	$3,181	$11,362	$134,198	$183,455
Employee B	32,692	92,485	2,873	9,985	105,343	138,035
Employee C	27,522	117,522	2,151	12,725	132,398	159,920
Employee D	49,221	128,586	2,892	11,922	143,400	192,621
Computer	23,185	596	38,122	8,828	47,549	70,731
All Other	146,748	263,749	10,009	78,978	352,736	499,484
Total	328,625	722,593	59,228	133,800	915,621	1,244,246

Figure 7.15 looks at employee A's off-campus recruitment costs in greater detail and focuses on per-trip costs. The basis for the allocation of employee A's total compensation cost is the percentage of full or fractional days (365 days equals 100 percent) spent on each trip. A one-day trip would represent 0.2736 percent of the total compensation represented by off-campus recruitment. A three-day trip would consume 0.8219 percent of $49,275 of compensation, or $404.85.

Figure 7.15: Activities Worksheet for Employee A, Off-Campus Activities (Trips)

Activity	Compensation	Travel	Supplies, Telephone, Etc.	Other	Total Consumables	Total Tier One
Trip 1	$2,106	$3,798	$211	$582	$4,591	$6,697
Trip 2	2,892	4,182	172	421	4,775	7,667
Trip 3	1,857	2,171	151	306	2,628	4,485
All Other	42,402	109,504	2,647	10,053	122,204	164,606
Total	49,257	119,655	3,181	11,362	134,198	183,455

Figure 7.16 gives key details of trip 1 costs.

Figure 7.16: Activities Worksheet for Employee A Showing Cost Detail for Trip 1

Activity	Compensation	Travel	Supplies, Telephone, Etc.	Other	Total Consumables	Total Tier One
Transportation	$884	$2,152	$0	$0	$2,152	$3,036
Dinner Meeting	85	1,108	0	322	1,430	1,515
Interviews	1,009	185	185	108	478	1,487
Review of Day	65	0	15	0	15	80
Other	63	353	11	152	516	579
Total	2,106	3,798	211	582	4,591	6,697

Returning to the inverted pyramid or funnel concept of figure 7.1, and assuming that per-trip costs summarize all recruitment activities taking place during a given trip, the sum of the costs of all trips can be seen as funneling into the inverted pyramid, creating the cost total shown in figure 7.15 for employee A, and from there for all employees to figure 7.14, and so on.

Alternative Off-Campus Recruitment Process Description

For the preceding discussion, the off-campus trip is the basic cost-center or activity. Each trip may involve more than one admissions counselor. During each trip, individual counselors will be engaged in a variety of different tasks. Some of these will be common to all counselors involved, while other activities may differ for some individuals. In this sense, each trip can be seen as a process in its own right, and institutions might wish to create cost-effective work assignments.

Figure 7.17 compares two activities lists, A and B, for two admissions counselors on the same trip, spending some of their time in identical activities and some on specialized duties. If it is assumed that the two individuals receive identical total compensation that, when allocated to this trip equals $404.85, then the cost allocation of this amount will result in very different activity costs, as shown in 7.18.

Figure 7.17: Itemizing Alternate Workscopes for Two Admissions Counselors During Trip 1

Employee A		Employee B	
Meeting with Students at Hotel	21 hours	Meeting with Students at Hotel	20 hours
Meeting with High School Counselor, School I	1 hour	Meeting with Students at High Schools	15 hours
Meeting with High School Counselor, School II	2 hours	Logistics	5 hours
Attend Three Dinner Meetings	5 hours		
Meeting with Alumni Representatives Involved in Recruitment	2 hours		
Meeting at One Applicant's Home	1 hour		
Staff Meetings	3 hours		
Miscellaneous	2 hours		
Total	37 hours	Total	40 hours

Note: Each counselor maintains a record of the time spent with prospective students and with high school counselors.

Summary and Conclusions

Process and activity costs are described in the *Process Costing Workbook* for the following processes: student applications, grade reports, purchase requisitions and orders, invoice payments, hiring of new employees, and grant proposals and awards. In the narrowest sense, these processes focus on the paperwork or information flow, but one cannot ignore the various decision points on the respective activities maps that describe the processes proper. In the broader sense, even the most paper-intensive among these processes involve numerous human interactions that often lack the one-directional linearity that the simplified process flowcharts imply.

Figure 7.18: Allocation of $404.85 to Activities

Activities	Employee A Hours	Employee B Hours	Employee A Costs	Employee B Costs
Activity 1	21	20	$229.78	$202.43
Activity 2	1	15	10.94	151.82
Activity 3	2	5	21.88	50.61
Activity 4	5		54.71	
Activity 5	2		21.88	
Activity 6	1		10.94	
Activity 7	3		32.83	
Activity 8	2		21.88	
Total	37	40	404.85	404.85

The preceding discussion focused on two managerial processes where decision making is a primary feature. The materials acquisition and handling process involves one type of management decision, centering on acquiring the right materials at the best price while keeping handling and inventory costs to a minimum. The enrollment management process-cost examples highlight subprocesses and subactivities where many different types of human interactions lead to decisions over which the institution has only limited control. Together, these distinct activities costs constitute the total cost of the entire enrollment management process. The revenue dimension was not included here since it was discussed in detail in chapter 6.

While the workscopes of individual employees may recognize some diary type time-use logs, the methodology shown here does not depend upon complex interviews and time sheets. Rather, each person's workscope is divided into percentage time segments that can be plugged directly into the payroll data that is downloaded from the payroll ledgers to the various worksheets and spreadsheets. The consumables natural-cost information is charged directly on the basis of purchase orders that identify the person originating them or are prorated to each individual on some percentage allocation basis. In the case of off-campus recruiting trips, most consumables costs can be identified with the traveling individuals.

There is merit in both the narrow, more or less mechanistic view of information flow-process and activity-cost analysis and the conceptually broader managerial processes discussed in this chapter. Whichever view is preferred, process and activity costing is incomplete if it focuses solely on personnel compensation costs. The FTFC model lends itself well to process and activity costing, as shown in the few examples shown above.

Conceptually, every administrative process, narrow or broad, is amenable to the kinds of analyses discussed here. Practically, several obstacles may have to be overcome. Foremost perhaps is the need to train the institution's personnel and to make palatable to employees the virtues of process and activity costing. Important also is the inevitable changes that will take place in the cost accounting system proper, since basic established accounting systems do not lend themselves to process- and activity-cost accounting. Thus, institutions interested in process and activity costing must be prepared to invest adequate resources to this effect.

Liberal Arts College's automated admissions and student aid inquiry systems, its increasingly paperless applications and student aid forms information system, and its advanced file maintenance and communications systems define key aspects of the entire enrollment management effort that will not be found elsewhere in exactly the same form and detail. All materials management and other software, while adapted from generalized models, reflect the institution's needs, preferences, and characteristics. Anyone involved in process and activity costing will soon discover that, general features notwithstanding, processes and activities are always institution-specific and therefore unique.

To what extent can a costing method invented primarily for manufacturing be applied to education activities? Obviously, Ernst & Young, Coopers & Lybrand, and the authors Brimson and Antos believe total cost management, activity-based costing, and process-cost management can and should be used by colleges and university.[9]

Notes

1. The following sources may be helpful introductions to the subjects:

   Michael R. Ostrenga, et al., *The Ernst & Young Guide to Total Cost Management* (New York: John Wiley & Sons, Inc., 1992).

   James A. Brimson, *Activity Accounting: An Activity-Based Costing Approach* (New York: John Wiley & Sons, Inc., 1991)

   James A. Brimson and John Antos, *Activity-Based Management for Service Industries, Government Entities, and Nonprofit Organizations* (New York: John Wiley & Sons, Inc., 1994).

   Douglas T. Hicks, *Activity-Based Costing for Small and Mid-Sized Businesses* (New York: John Wiley & Sons, Inc., 1992).
2. Coopers & Lybrand with Barbara S. Shafer Associates, *Benchmarking for Process Improvement in Higher Education: Process Costing Workbook FY 1994* (Washington, D.C.: NACUBO, 1995), chapter 2. The workbook is only available to Benchmarking Project participants.
3. Ostrenga et al., *The Ernst & Young Guide*.
4. Ibid., 61, 75.
5. Ibid., 87.
6. *Process Costing Workbook*, 17.
7. *Process Costing Workbook*, 72.
8. One of the seminal achievements in management science was the development of optimal cost-inventory and transportation cost models, which have had a far-reaching effect not only on an enterprise's costs but on the behavior of the business cycle. Inventory models in particular are early examples of inventory-process costing and have many applications in higher education. Inventories are often financed by means of short-term debt in anticipation of future revenues from sales. Such borrowing entails interest costs that should be charged to the cost centers that engender the inventories and the debt. The "efficient transportation" model was backed for many years by a prize incentive to encourage a solution.

9. Brimson and Antos, *Activity-Based Management*, 221. The step-two exhibit lists many natural-cost elements, including different types of personnel costs. Frequently, accountants develop overhead charges that represent the natural costs. See also Hicks, *Activity-Based Costing*, 59, for a lucid and detailed presentation of the most important types of natural activity costs.

Exercises

1. Prepare flowcharts for the processes listed below as they apply at your institution. If your activities differ from any indicated here, please substitute them.

A. Materials management:

- Identification of materials and supplies to be acquired
- Receiving, storing, distributing, and liquidating materials acquired. (Consider inventory policies for operating versus plant construction and improvement materials. Do you have a point-of-use, or point-of-sale, acquisitions policy? Do you use inventory cost optimization models?)
- Originating, tracking, and filing of purchase requisition–purchase order documents (Is your system paperless, paper-intensive, or a mixture?)

B. Personnel requisition and hiring process: Develop a flowchart of this process at your institution. Please identify points on the chart where a managerial decision occurs.

C. Gift-receiving and recording process. Distinguish throughout between simple routing, clerical, and nondecision activities and those that require managerial decisions. If the latter are subprocesses with more than one step, sketch these as well.

2. Construct an admissions-process flowchart that begins at the moment an admissions counselor is assigned to an individual applicant and continues through this counselor's activities to matriculation. Develop a process-cost worksheet (similar to figures starting at figure 7.11) for the activities the counselor is engaged in.

3. Develop a flowchart and accompanying process-cost worksheet for the annual alumni gift solicitation, receiving, and recording process (involving all the human activities, resources, etc., not merely the tracking of a gift form) following NACUBO's *Process Costing Workbook*.

— 8 —

Other Costing Topics and Issues Involved in Developing a Comprehensive Costing System

Among the topics covered in this chapter are—

- the cost of costing,
- capital cost issues,
- marginal costs,
- how institutions can deal with costing mandates that may not be in their best long-range financial interest, and
- total quality management.

Multiple Allocation Bases

Even if one adheres closely to the affinity principle, it is likely that more than one allocation base will be available for allocating most types of costs. This fact is made clear by the several lists of available allocation bases shown earlier. Sometimes, the use of alternate allocation bases will show small differences in the resulting costs; sometimes the cost differences are very large.

Different Financial Policies

An important financial policy concern is how capital costs are determined. Full costing requires that operating costs be supplemented by capital costs. If the cost of capital is represented by depreciation, the particular depreciation method and the specific capital valuations used will determine the size of the depreciation charge. If the cost of capital is represented by a facilities-use charge, its underlying composition and method of calculation determine the actual capital cost.

Many depreciation charges reported by some colleges and universities are far from accurate. Many institutions make no distinction between plant and equipment, and write off depreciable plant and equipment assets on a straight-line 50-year useful-life basis. Although the practice is simple and keeps the depreciation charge and the ensuing full costs low, it also produces superficial and unrealistic results.

Compare this practice to that of many institutions where depreciation costs are based on a careful and detailed analysis of the differential useful lives of their classes of assets. Other things being equal, depreciation rates that do not overstate the remaining useful life of depreciable assets are preferable.

Even if all institutions computed their capital or depreciation costs on the basis of careful distinctions of the remaining useful lives of all depreciable assets, identical total asset values would still result in different depreciation costs because the useful-life mix of depreciable assets is not identical among institutions.

Another cause for capital cost differentials arises among institutions that prefer a facilities-use charge. Such charges can be based on historical asset costs and resemble a traditional depreciation charge with or without a surcharge, or they can be based on asset replacement values. Obviously a replacement cost–based capital charge will be significantly higher than one that focuses on historical asset values.

For these and other reasons, capital costs will always differ among institutions, even when the capital charge is calculated on the basis of similar, generally accepted, principles.

Once a given capital cost has been calculated, how this cost is allocated to the various cost centers becomes a major factor determining costs. For instance, the square-footage allocation method produces different results than either the per-FTE-student or per-credit-hour allocation method, and the total-square-footage method results in different allocated costs than the assigned-square-footage method.

Different Pooling Practices and Loss of Costing Precision

Pooling practices and the desired degree of cost precision are also matters that both define and are influenced by financial policy. Institutional pooling practices affect operating and full costs. Pooling allegedly is a virtue because it simplifies cost allocation. Pooling is a major feature in indirect-cost-recovery accounting under Office of Management and Budget Circular A-21.[1] Many simplified cost allocation practices, including pooling, can be major causes of reduced costing precision. Less precision is achieved when pooled direct costs are later distributed among cost centers on some percentage basis or when pooled costs are prorated to cost centers in large lump sums without regard to the natural-cost structure. The examples shown in the preceding chapters demonstrated this tendency. While lump-sum cost allocation will be more than adequate in many costing applications, many situations require attention to detail that is lost in lump-sum cost allocations.

The Cost of Costing

Another financial concern is the cost of costing. Many current costing practices have been introduced because they help contain this particular cost. It is therefore useful for institutions to make a judgment about the cost/benefit tradeoffs associated with the desire for greater costing precision. In macro-costing tasks, such as the costing of broad academic programs or of major administrative functions, a considerable loss of precision can be tolerated. Heightened precision in costing may matter most in micro- and activity costing of the types described in chapter 7.

Specifically, managers must decide when it is important for them to know how natural costs are affected when support and other indirect costs are finally allocated to primary programs. Every budget has a natural cost structure, yet a large portion of costing practice ignores the cost allocation effects on natural costs. This is not to suggest that all costing must take natural-cost effects into account, but that a concern with these effects might be evident more often than is now the case.

Ideally, when support and indirect personnel costs are allocated to cost centers, they should be added to direct personnel costs. Operating costs for support and indirect consumables should be allocated to direct consumables operating costs. Finally, support and indirect capital costs should be added to direct capital costs. Much of the current practice in support and indirect-cost allocation and cost prorating skips over such niceties as an expensive inconvenience. But when managers are confronted with budget cutbacks and competitive reversals, they discover that any ensuing cost cutting eventually takes place first in the real world of their natural costs and only by inference in some artificial indirect- or overhead-cost pool.

If cost pooling simplifies indirect-cost recovery, so be it; indirect costs are not the primary concern in costing. The overriding reason for costing in any enterprise is to help managers improve the allocation of scarce resources. However large the amount of indirect-cost recovery may be, cost-recovery accounting is only one dimension of an institution's total costing effort. In many institutions, it is actually of small consequence. The other costing issues are far more significant. Cost pooling or other cost-saving costing methods must not become a panacea for all costing efforts.

Ever since the initial NACUBO and National Center for Higher Education Management Systems (NCHEMS) efforts to refine academic-program and instructional costing, interest has been growing in the costs of institutional activities that are not captured well by the traditional functional cost accounts.[2] Increasingly, institutions and others are trying to come to grips with the costs of specific institutional services. Most, if not all, institutional services involve more than one department and more than one jurisdiction. This has always been the case to some extent, but it may be of greater significance today than in the past.

Modern collegiate management requires an appropriate managerial cost accounting point of view. A cost accounting system dominated by indirect-cost recovery and by-function cost accounting concerns simply does not address adequately the interdepartmental and interservice aspects of modern cost deployment and cost management. Thus, when institutions are confronted with the costing needs implicit in novel ways of looking at cost management, they cannot and should not avoid the new approaches simply because they might be unsettling or involve startup costs.

Direct and Full Costing in a World of Computer Sophistication

Many of today's macro-costing practices predate modern personal computer and software technology. Early program and activity costing inaugurated the more advanced costing models found in modern, commercially available software. The diverse costing models in use at colleges and universities enable managers to maximize direct macro- and micro-costing.

If precision in costing is a goal, transfer pricing and chargebacks are desirable ways for institutions to maximize direct costing. By maximizing direct costing, the true indirect overhead and support costs emerge. Direct costing reduces the number and size of the remaining unallocated cost pools. What remains are the costs of key support services. Pooling also obliterates key distinctions between direct and indirect costs and between variable and fixed costs. Appropriate cost-crossover algorithms and modern computer technology can help keep these distinctions clear.

The Meaning of Maximum Direct and Full Costing

Maximum direct costing occurs when an institutional user is charged for the full costs associated with a service. The four cost tiers embodied in the four-tier full-cost (FTFC) natural-cost model assume that the full cost of each activity can be determined. In the natural-cost structure, there is an object line for each type of cost. An allocation factor or price can be predetermined for each natural-cost element so that it can be charged to a specific activity. The more internal pricing there is, the less percentage allocation will be necessary. Internal pricing and chargebacks depend on or can be derived standard costs and standard-cost ratios, and serve as useful cost allocation bases between suppliers and users.

Capital-Cost Dimensions Other Than Depreciation and Facilities-Use Charges

Colleges and universities periodically face major capital investment decisions when they acquire new plant and equipment. Historical costs defined through a depreciation or capital use charge are not always very useful capital-cost measures. Instead project lifecycle costing and methodologies and concepts used in capital budgeting may be more appropriate.[3]

The Time Value of Money

In planning capital projects and large equipment acquisitions, institutions need to focus on the time value of money. Although not-for-profit enterprises may not see a financial rate of return when they invest in new plant and equipment, there usually is some measurable payoff. For instance, modern computer equipment may increase productivity and reduce labor costs or render services faster or with greater accuracy.

One or more of the following concepts may be relevant:

- Discounted cash flow compares cash inflows with cash outflows at specified rates of interest (the cost of borrowing or forgone income had the money been invested).
- Internal rate of return is the rate of return at which the present value of future cash inflows equals the present value of future cash outflows—normally expressed as a percentage.
- Net present value discounts expected future cash inflows and outflows at a specific rate of return—normally expressed as a dollar value.

These three capital concepts are closely related and are used routinely in capital budgeting. They all ignore conventional accrual accounting methodologies.

Investment Payback

If plant and equipment decisions are viewed as investment decisions by colleges and universities, a payback analysis can be part of the costing or budgeting decision. Payback is expressed as the number of years it takes to recoup the original investment with estimated future consecutive identical or varying annual cash inflows directly ascribed to the new investment. Payback analysis can also be based on estimated future general revenues if there is no direct link between the acquisition and future revenues. Housing facility financing is often viewed in this light.

Break-Even Time and Capital Costs

Most new capital investments tend to increase the need for new working capital. At the end of the cycle, the new working capital will have been fully recouped, but the new capital investment may be recovered only in part. Break-even-time analysis goes beyond discounted-cash-flow analysis and estimates the time it would take to recoup the entire investment.

Investments With a Limited Time Horizon

Colleges and universities have learned that some new projects do not succeed or that they can be funded only for a limited time, after which they have to be canceled. Most new higher education ventures represent combinations of human and physical capital. If an unsuccessful project must be terminated, the human capital it uses may or may not be eliminated. If it is not, other programs must absorb the remaining costs. Facilities and equipment, on the other hand, may have significant terminal value for other uses at the institution or uses for others outside the institution. In the worst case, they have salvage value. By figuring the terminal or salvage value into any time-value calculation, the number of payback or break-even years can be shortened significantly. These elements tend to reduce costs.

Inflation and Capital Costs

Time-value analysis of capital costs focuses on nominal interest and discount rates. Real return, on the other hand, calls attention to the investment return after inflation-related costs have been eliminated. Over long periods of time, the expected real rate of return on capital has been somewhere between 2.5 and 3.5 percent. In recent years, the expected real rate of return has often exceeded 4 percent.

Since the inflation rate varies over time, a constant present-value discount rate may not be the right capital cost measure, since it tends to reflect a constant current inflation rate. As soon as inflation rises, the discount rate rises; and when inflation falls, the discount rate falls. In contrast, the normal real rate of return changes less than the inflation rate. It may be more appropriate to view the cost of capital in after-inflation or real-rate-of-return terms. This, again, is a cost accounting concept that is not captured by accrual accounting.

Textbooks on cost accounting always spend considerable space on these and related capital cost concepts, normally in a for-profit setting. These concepts should be applied before investment decisions are made in nonprofit situations as well.

Fixed, Variable, and Marginal Costs

Instead of concentrating on the distinction between direct and indirect costs, dynamic cost analysis distinguishes between fixed, variable, and marginal costs:

- Fixed costs do not change with changes in output.
- Variable costs change in some proportion to output.
- Marginal costs are defined as the change in total costs resulting from a change (addition or reduction) of a unit of output. For instance, if total costs increase by $5,000 and output increases by 1,000 units, the resulting marginal cost is $5 per new unit of output.

Unfortunately it is not always easy to compute marginal costs in higher education. First, one has to agree on which are the fixed costs and which are the variable costs. Most studies involving marginal costs have centered on the cost of instruction, and researchers have found that instructional costs do not necessarily respond to enrollment fluctuations unless the enrollment change is relatively large and the trend holds over several terms. How responsive is faculty personnel compensation to changes in enrollment? How do nonfaculty personnel and consumables costs respond to changes in student demand? Does it make a difference if marginal costs are studied on an institutionwide basis by primary programs only or at the departmental level? What is the difference between the marginal economic costs of instruction and marginal accounting costs?

A number of studies have addressed these and related questions, and the answers are often lengthy and involved. Two studies examine the issue of marginal costs directly and in quite different ways. The first is described in *Costing for Policy Analysis* in a chapter entitled "Drake: Instructional Capacity,"[4] and the second was published in *Research in Higher Education* under the title, "The Marginal Costs of Instruction."[5] The first study, undertaken at Drake University, focuses on accounting costs, whereas the second emphasizes the economic costs of instruction. Here, the discussion is limited to marginal accounting costs.

The Drake study focuses on cost differences that arise when course enrollments are less than classroom capacity would allow. Marginal cost computations are derived from a set of linear equations where marginal costs are always equal to average variable costs (MC equals AVC). The Drake study also performs a regression analysis of the departmental cost data in question and the related student credit hours and computes the marginal cost or slope of the cost curve at the fixed cost intercept for each department. The various computations and R-square values led the analysts to conclude that "faculty costs do not respond directly to changes in enrollments, even over several years."[6]

In contrast, the authors of "The Marginal Costs of Instruction" analyze economic costs which include opportunity costs rather than accounting costs. Opportunity costs are the costs of forgone activities. This study defines marginal costs as "the economic costs of incremental enrollments" and analyzes the faculty and administrative incentives that are associated with marginal costs when resource allocation choices are made. This is a seminal study in the economics of higher education, primarily focusing on graduate enrollments at a large research university.

Liberal Arts College and Marginal Costs

Here, the discussion is limited to accounting costs in their simplest manifestation. Marginal instructional costs are normally associated with incremental enrollments or with the variations in the production of academic credits. Enrollments in courses may exceed the credits finally certified. Changes in marginal instructional costs can occur within departments for each course, among departments where courses involve interdepartmental faculty and staff, within entire academic programs, such as architecture, within an entire professional school or division, such as a law school, within a single campus, and within a multicampus system. In each case, the analysis will involve different cost composites and will become more difficult and complex as the cost center studied becomes more complex and comprehensive.

The Marginal-Cost Effect of Adding a Course Section

Within the institution, marginal accounting costs can be studied for well-defined operational entities. Two examples from Liberal Arts College will be used.

Figure 8.1 identifies fixed and variable costs for a single course offered in more than one section before and after a change in enrollment. Enrollment is measured in terms of credit hours. An enrollment over-subscription requires the net addition of a course section which causes, among other costs, an overload payment to one of the instructors and some new variable costs. Figure 8.2 explores these same costs on the basis of incremental credit hours, six hours at a time.

Since the instructor's teaching load is now increased, the total compensation—which does not change—is divided among five, rather than four, work-load units in the course-load matrix, each unit amounting to $11,400. This reduces the cost of section 101-3 by $2,850, or $17.27 per credit hour. The total cost base is now $13,212.

For section 101-4 (figure 8.1), the instructor agreed to teach the additional course section for an overload stipend of $35 per credit hour. After adding direct clerical and consumables costs of $789, the cost of section 101-4 comes to $16,999, for a new total combined cost of $30,211.

Figure 8.1: Liberal Arts College's Fixed, Variable, and Marginal Costs for Economics 101-3 and 101-4

Types of Costs Tier One	Fixed Costs	Variable Costs	Total Costs	Credit Hours	Average Costs	Marginal Costs
Section 101-3						
One-fourth of Compensation, Faculty	$14,250		$14,250	$165	$86.36	
Clerical Support		$895	895	165	5.42	
Consumables		792	792	165	4.80	
Subtotal	14,250	1,687	15,937	165	96.59	
Minus Compensation Adjustment	-2,850		-2,850	165	-17.27	
New Total	11,400	1,687	13,087	165	79.32	
Tiers 2 through 4	125		125	165	0.76	
Total	11,525	1,687	13,212	165	80.07	Not Applicable
Section 101-4						
One-fifth of Compensation	11,400		11,400	135	84.44	
Overload	4,725		4,725	135	35.00	
Clerical Support		357	357	135	2.64	
Consumables		432	432	135	3.20	
Subtotal	16,125	789	16,914	135	125.29	
Tiers 2 through 4	85		85	135	0.63	
Total	16,210	789	16,999	135	125.92	$125.92
Combined Total	27,735	2,476	30,211	300	206	125.92

Note: Marginal costs equal change in total costs divided by change in credit hours.

In figure 8.2, the new combined fixed cost of $29,585 kicks in at 170 credit hours and variable costs rise to the combined $2,476 level at 300 credit hours. The fixed cost column of figure 8.2 has been adjusted to reflect the new one-fifth compensation of $11,400. Each time a course section (or a new course) is added or eliminated, a step-function increase or decrease similar to that at 170 credit hours takes place.

In figure 8.1, average and marginal costs are identical because there is only one increment. Figure 8.2 shows nonlinear increments as credit hours rise; it resembles the typical marginal-cost curve normally found in introductory economics texts.

The examples also assume that section 101-3 is filled to capacity before section 101-4 is added. In reality, both course sections may have unused capacity, in the sense that not all seats are filled or that class size is less than optimal. When institutions plan the number of sections that a course may need or that available staff are able or willing to accommodate, they always should base their estimates on historical or probable class occupancy and not on optimal rates. Therefore, the credit-hour or output transition from section to section will not be as smooth as in the figure 8.2 illustration.

Figure 8.2: Marginal-Cost Analysis for Liberal Arts College, Student by Student

Credit Hours	Fixed Costs	Variable Costs	Total Costs	Marginal Costs (per credit hour)
6	$11,400	$560	$11,960	$0.00
12	11,400	580	11,980	3.33
18	11,400	600	12,000	3.33
24	11,400	620	12,020	3.33
30	11,400	680	12,080	10.00
36	11,400	740	12,140	10.00
42	11,400	800	12,200	10.00
48	11,400	850	12,250	8.33
54	11,400	900	12,300	8.33
60	11,400	950	12,350	8.33
66	11,400	1,000	12,400	8.33
72	11,400	1,050	12,450	8.33
78	11,400	1,100	12,500	8.33
84	11,400	1,150	12,550	8.33
90	11,400	1,200	12,600	8.33
96	11,400	1,250	12,650	8.33
102	11,400	1,300	12,700	8.33
108	11,400	1,350	12,750	8.33
114	11,400	1,400	12,800	8.33
120	11,400	1,430	12,830	5.00
126	11,400	1,470	12,870	6.67
132	11,400	1,500	12,900	5.00
138	11,400	1,530	12,930	5.00
144	11,400	1,560	12,960	5.00
150	11,400	1,590	12,990	5.00
156	11,400	1,620	13,020	5.00
162	11,400	1,657	13,057	6.17
165	11,400	1,687	13,087	10.00
170	27,735	1,850	29,585	3,299.60
175	27,735	1,900	29,635	10.00
180	27,735	1,950	29,685	10.00
185	27,735	2,000	29,735	10.00
190	27,735	2,050	29,785	10.00
195	27,735	2,100	29,835	10.00
200	27,735	2,150	29,885	10.00
210	27,735	2,200	29,935	5.00
225	27,735	2,250	29,985	3.33
240	27,735	2,300	30,035	3.33
255	27,735	2,350	30,085	3.33
270	27,735	2,400	30,135	3.33
285	27,735	2,440	30,175	2.67
300	27,735	2,476	30,211	2.40

Note: Change in variable costs is hypothetical.

Marginal Costs for the Department and the Institution

The preceding illustration focuses on marginal costs in a strictly limited sense as the incremental costs caused by a change in enrollment after the addition of a course section. This is not the true marginal accounting cost for either the department in question or for the institution as a whole. Figure 8.3 looks at the effects on total departmental costs when section 101-4 is added to the department's offerings. For the department as a whole, total incremental costs are $5,429, and marginal per-credit-hour costs equal $2.37.

Figure 8.3: Departmental Marginal Costs for Liberal Arts College

Types of Costs		Data Source	Total Marginal Costs	Credit Hour Marginal Costs
Total Costs Without 101-4	$1,012,308			
New Section 101-4 Costs				
A. Overload Compensation	4,725	From 8.1		
B. New Clerical	298	From 8.1*		
C. New Consumables	321	From 8.1*		
D. Total New Tier One	5,344			
E. New Tiers 2-4 Costs	85	From 8.1*		
F. Total New Costs	5,429			
Total Costs With 101-4	1,017,737		$5,429	$2.37

* Minus allocated costs.

Figure 8.4 shows how much of this incremental departmental cost is also incremental cost to the institution as a whole. Some departmental costs are allocated institutional costs and therefore not incremental for the institution as a whole. For instance, only $106 of clerical costs were the result of additional hours worked, and the $156 of consumables costs are net of all allocated costs and thus truly incremental. For the institution as a whole, the addition of section 101-4 resulted in a per-credit-hour incremental cost of 8.29 cents.

Figure 8.4: Institutional Marginal Costs for Liberal Arts College

Types of Costs		Data Source	Total Marginal Costs	Credit Hour Marginal Costs
Total Costs Without 101-4	$25,640,000			
New Section 101-4 Costs				
A. Overload Compensation	4,725	From 8.3*		
B. New Clerical	106	From 8.3*		
C. New Consumables	156	From 8.3*		
D. Total Tier One	4,987			
E. New Tiers 2-4 Costs	15	From 8.3*		
F. Total New Costs	5,002			
Total Costs With 101-4	25,645,002		$5,002	$0.0829

* Figure 8.3 data minus allocated costs.
Note: Total credit hours are increased from 59,670 to 60,314.

The example assumes that the increase in departmental enrollment was caused by an increase in overall enrollment. The enrollment increase would raise costs throughout the institution, but would also increase revenues. On the other hand, the increase in departmental demand that led to the addition of section 101-4 could have been caused by an internal shift of enrollments among all departments, changing the internal distribution of departmental credit-hour costs and revenues without affecting total institutional revenues.

The preceding illustrations make the following important point: The actual meaning and size of marginal costs depend entirely on the cost center or cost objective being analyzed. At each level of cost aggregation—a course, a department, the institution as a whole—a given change in activity costs will produce different marginal costs, as shown above in figures 8.1 through 8.4.

Marginal Costs Equal Marginal Revenues or Optimum Revenues and Costs

The ultimate use of marginal-cost analysis centers on how marginal costs relate to marginal revenues. As in the for-profit sector, the optimum or profit-maximizing situation for instruction is achieved at the enrollment level where marginal revenues equal marginal costs.

The preceding examples do not account for support costs that might be allocated to departments and courses. If an institutionwide enrollment increase results in higher support costs, whether or not these are allocated to departments and courses, additional marginal costs arise for the institution as a whole and for any affected activities. Such costs would have to be added to the above illustrations. It is not always easy to track all of the induced support-cost changes caused by enrollment fluctuations.

The Effect on Marginal Costs of Changes in Support Activities and Auxiliary Enterprises

Marginal-cost analysis is useful in the management of support services per se, preferably before new budgets are approved and especially when institutions plan changes in operational activities.

Many support activities—libraries, for instance—are experiencing significant technological change, in particular the more pervasive use of computers, CD-ROM technology, and computer-based telecommunications. In part, this means that library operations are becoming more capital intensive. This increases fixed cost. One interesting fallout is that student and faculty uses of library facilities can be more readily measured: Every computer and telecommunications use can be logged automatically, and theoretically a related cost can be charged to appropriate user accounts. Institutions can develop appropriate full-cost algorithms, and telecommunications costs are easy to identify. The changing structure of library operating costs can be analyzed profitably by means of marginal-cost studies.

Auxiliary enterprises are another area where marginal-cost analysis is appropriate, since changes in marginal costs are an indicator of any necessary future price change. If prices must cover costs or help achieve a specific revenue target, changes in marginal costs can tell managers what kinds of price changes will accomplish the desired results under specific service-demand and service-cost assumptions.

In general, marginal-cost analysis is appropriate before any external or internal pricing decisions are made. Future changes in internal transfer prices and chargebacks are documented most convincingly by means of appropriate marginal-cost analysis.

Changes in marginal costs depend not only on how total costs change, but on how fixed and variable costs interact. Marginal fixed costs decline with rising output until (as shown in figures 8.1 and 8.2) a new layer of fixed costs is added. After this step-function increase, marginal fixed costs begin to decline again, but only to a certain point. Variable costs, on the other hand, may increase slower or faster than output or at a constant rate. Marginal costs begin to increase when variable costs rise at an accelerating rate. When managers understand how a change in the mix of fixed and variable costs will affect marginal costs, they will make more intelligent pricing and cost allocation decisions. The more traditional focus on indirect costs produces very little useful information for pricing decisions.

Marginal Costs and Long-Range Planning

Marginal-cost analysis is especially useful when institutions develop their long-range plans, particularly when these plans include the elimination or addition of programs. The analysis will prove fruitful even if these eliminations and additions are not monumental and occur within academic divisions and academic or administrative departments. Regardless of the total dollar amount involved, institutions should develop future plans on the basis of marginal cost models that permit managers to simulate alternative scenarios with different fixed- and variable-cost mixes.

In the Drake University case mentioned earlier, the authors concluded that marginal-cost analysis was less useful than what they called "capacity analysis." One reason was that each department's marginal costs were assumed to be linear and thus identical with average costs. In the real world, marginal costs are seldom linear, although colleges and universities may find it difficult to determine precisely how variable costs behave for different levels of student demand. The smooth progression of variable costs shown in figure 8.2 may be difficult if not impossible to replicate. Also, the 50-50 split between fixed and variable costs assumed in the Drake University example does seem to be an oversimplification, if one considers the normal relationship between personnel compensation, consumables, and capital costs.

If it is true that faculty size does not respond very well to changes in enrollment, as both the Drake University case and the Hoenack study suggest, maybe it is appropriate to consider most personnel compensation costs as fixed, rather than variable, even in the short run. In the long run, all costs are variable, but higher education in particular is afflicted with the very nonvariable fixed cost of its tenured staff. The size of the maintenance payroll is not at all related to short-term fluctuations—especially minor ones—in enrollment, and even an in-house food service department will have a core staff that does not change in direct proportion to the volume of meal contracts.

Colleges and universities probably do not have a clear idea of their fixed and variable costs. If they have a direct/indirect cost preoccupation, institutions may not pay enough attention to the nature of their fixed/variable cost mix. Thus, they do not know where, in terms of prices and revenues, their most efficient output levels might be. Optimal or maximum class sizes are normally determined by factors other than costs. For instance, at Liberal Arts College, with few exceptions, faculty members on their own decide the optimal or maximum size of their classes, advisement sections, and tutorial arrangements. This is fine if it can be afforded. Perhaps especially for analyzing alternative cost effects of this type of behavior, marginal-cost analysis is indispensable for long-range planning.

Figure 8.5: Alternative Marginal Cost Calculation

Part A: Variable Costs Increase With Output, Fixed Costs Remain Unchanged

Quantity Produced (A)	Total Fixed Costs (B)	Total Variable Costs (C)	Total Costs (D)	Average Fixed Costs (E)	Average Variable Costs (F)	Average Total Costs (G)	Marginal Costs (H)
100	$10,000	$500	$10,500	$100.00	$5.00	$105.00	$0.00
200	10,000	750	10,750	50.00	3.75	53.75	2.50
300	10,000	1,000	11,000	33.33	3.33	36.67	2.50
400	10,000	1,250	11,250	25.00	3.13	28.13	2.50
500	10,000	1,500	11,500	20.00	3.00	23.00	2.50
600	10,000	1,750	11,750	16.67	2.92	19.58	2.50
700	10,000	2,000	12,000	14.29	2.86	17.14	2.50
800	10,000	2,250	12,250	12.50	2.81	15.31	2.50
900	10,000	2,500	12,500	11.11	2.78	13.89	2.50
1,000	10,000	2,750	12,750	10.00	2.75	12.75	2.50

Notable Columns:
B: Fixed costs remain constant throughout.
C: Variable costs increase by $250 at each level of quantity produced.
D: Total costs increase at rate of variable costs.
H: Marginal costs are constant.

Part B: Fixed Costs Increase Periodically as Output Increases

Quantity Produced (A)	Total Fixed Costs (B)	Total Variable Costs (C)	Total Costs (D)	Average Fixed Costs (E)	Average Variable Costs (F)	Average Total Costs (G)	Marginal Costs (H)
100	$10,000	$500	$10,500	$100.00	$5.00	$105.00	$0.00
200	10,000	750	10,750	50.00	3.75	53.75	2.50
300	10,500	1,000	11,500	35.00	3.33	38.33	7.50
400	10,500	1,250	11,750	26.25	3.13	29.38	2.50
500	11,000	1,500	12,500	22.00	3.00	25.00	7.50
600	11,000	1,750	12,750	18.33	2.92	21.25	2.50
700	11,500	2,000	13,500	16.43	2.86	19.29	7.50
800	11,500	2,250	13,750	14.38	2.81	17.19	2.50
900	12,000	2,500	14,500	13.33	2.78	16.11	7.50
1,000	12,000	2,750	14,750	12.00	2.75	14.75	2.50

Notable Columns:
B: Fixed costs increase at every second interval of quantity produced.
C: Variable costs as in Part A.
H: Marginal costs rise when fixed costs rise.

Part C: Fixed Costs Increase Significantly at Intervals of Output; Variable Costs Increase at Declining Rate

Quantity Produced (A)	Total Fixed Costs (B)	Total Variable Costs (C)	Total Costs (D)	Average Fixed Costs (E)	Average Variable Costs (F)	Average Total Costs (G)	Marginal Costs (H)
100	$10,000	$500	$10,500	$100.00	$5.00	$105.00	$0.00
200	10,000	850	10,850	50.00	4.25	54.25	3.50
300	10,000	1,125	11,125	33.33	3.75	37.08	2.75
400	20,000	1,355	21,355	50.00	3.39	53.39	102.30
500	20,000	1,535	21,535	40.00	3.07	43.07	1.80
600	20,000	1,660	21,660	33.33	2.77	36.10	1.25
700	30,000	1,725	31,725	42.86	2.46	45.32	100.65
800	30,000	1,730	31,730	37.50	2.16	39.66	0.05
900	30,000	1,735	31,735	33.33	1.93	35.26	0.05
1,000	40,000	1,740	41,740	40.00	1.74	41.74	100.05

Notable Columns: C: Fixed costs increase significantly at 400, 700, and 1,000 units of output; more dramatic than Part B.
H: Marginal costs rise, then fall, then rise, etc., as fixed costs are added.

Conclusions

- When fixed costs remain the same over increasing levels of output, marginal costs are a function of or vary with variable costs.
- When fixed costs increase periodically with rising output, economists see this phenomenon as a change in the production function or a change in long-run costs.
- The column H behavior is typical for instructional costs in higher education; please see Figure 8.6, following.
- If column H were plotted as a curve, it would be called a planning curve.

In conclusion, the following three exhibits provide some additional insights into the conditions under which the slope of marginal costs change. Figure 8.5 illustrates three different cost scenarios, each leading to its particular marginal costs. Figure 8.6 traces a department's costs over time as staff is added under rising enrollments. Figure 8.7 compares a limited cost scenario with the related changes in marginal revenues.

External Costing Mandates

External costing mandates are not always in the best financial interest of institutions, most notably when the mandates favor the external agencies that provide the funds. Office of Management and Budget Circular A-21 and similar government regulations are the clearest examples. Another example is the imposition of Cost Accounting Standards Board (CASB) rules on certain universities whose federally funded research grants and contracts meet certain requirements.

Every extra layer of rules complicates internal costing, especially if the imposed rules are different from the ones the institution would choose for its most sophisticated internal cost accounting needs. The preceding chapters contained numerous examples where the cost results changed when different cost allocation rules were implemented. While external mandates can be perceived as financially harmless, there is a near-unanimous consensus that Circular A-21 and

CASB may not affect revenues adversely, but may require excessively burdensome procedures and thus may increase costs.

Figure 8.6: Marginal Costs in an Academic Department Implementing a 15:1 Student/Faculty Ratio

FTEs	Ratio FTEs/Faculty	Activity	Addition to Fixed Cost	Fixed Costs Cumulative	Variable Costs	Total Costs	Change in Total Costs/Change in FTEs
1	1 to 1	Hire Assistant	$32,000	$32,000	$5,000	$37,000	$ 0
2	2 to 1		0	32,000	5,030	37,030	30
3	3 to 1		0	32,000	5,060	37,060	30
4	4 to 1		0	32,000	5,090	37,090	30
5	5 to 1		0	32,000	5,110	37,110	20
6	6 to 1		0	32,000	5,130	37,130	20
7	7 to 1		0	32,000	5,150	37,150	20
8	8 to 1		0	32,000	5,170	37,170	20
9	9 to 1		0	32,000	5,190	37,190	20
10	10 to 1		0	32,000	5,210	37,210	20
11	11 to 1		0	32,000	5,220	37,220	10
12	12 to 1		0	32,000	5,230	37,230	10
13	13 to 1		0	32,000	5,240	37,240	10
14	14 to 1		0	32,000	5,250	37,250	10
15	15 to 1		0	32,000	5,260	37,260	10
16	16 to 2	Hire Associate	42,000	74,000	8,350	82,350	45,090
17	17 to 2		0	74,000	8,400	82,400	50
18	18 to 2		0	74,000	8,450	82,450	50
19	19 to 2		0	74,000	8,500	82,500	50
20	20 to 2		0	74,000	8,550	82,550	50
25	25 to 2		0	74,000	8,750	82,750	40
30	30 to 2		0	74,000	8,950	82,950	40
35	35 to 3	Hire Assistant	31,000	105,000	12,550	117,550	6,920
40	40 to 3		0	105,000	13,550	118,550	200
45	45 to 3		0	105,000	14,600	119,600	210
50	50 to 4	Hire Assistant	38,000	139,000	27,950	166,950	9,470
60	60 to 4		0	139,000	29,900	168,900	195
70	70 to 4		0	139,000	32,800	171,800	290
80	80 to 5	Hire Assistant	35,000	174,000	34,700	208,700	3,690
90	90 to 6	Hire Assistant	32,000	206,000	36,600	242,600	3,390
100	100 to 6	Hire Teach	12,500	218,500	38,400	256,900	1,430
110	110 to 7	Hire Teach	15,000	233,500	40,000	273,500	1,660

Note: This table illustrates several interesting facts about marginal cost behavior: First, marginal costs increase whenever fixed costs take a leap. Second, marginal costs also increase whenever the growth of variable costs accelerates. Third, the average revenue requirement or price decreases with rising enrollment, but jumps when fixed costs increase. Conclusion: For long-range planning, it is important to know how total fixed costs and total variable costs behave and why they behave as they do.

Figure 8.7: The Effects on Costs of Adding "Indivisibilities" Such as Lump-Sum Prorated Support or Indirect Costs

FTEs	Transactions	Invoice or Costs	Total Fixed Cost	Total Variable Costs	Total Cost	Total Cost Cumulative	Minus Amount Not Depreciated Currently	Total Full Cost Cumulative	New Revenues	Revenues Cumulative	Cumulative Profit or Loss	Total Marginal Costs	Total Marginal Revenues	Cumulative Total Marginal Revenues Minus Total Marginal Costs
	Term One													
50	Beginning Balance	$0	$139,000	$27,950	$166,950	$166,950		$166,950	$0	$170,000	$3,050	$0	$0	$0
50	Add Supplies	55		55	55	167,055		167,055		170,000	2,995	55	0	-55
50	Buy 3 Computers	4,500	4,500		4,500	171,505	$3,600	167,905		170,000	2,095	900	0	-900
50	Add Supplies	73		73	73	171,578		167,978		170,000	2,022	73	0	-73
50	***Term Two***													
60	Add FTEs	34,000			0	171,578		167,978	34,000	204,000	36,022	0	3,400	3,400
60	Add Assistant Professor													
60	Two-Term Cost Equivalent	22,000	22,000		22,000	193,578		189,978		204,000	14,022	22,000	0	-22,000
60	Add Supplies	85		85	85	193,663		190,063		204,000	13,937	85	0	-85
60	Receive Research Grant	15,000				193,663		190,063	15,000	219,000	28,937	0	15,000	15,000
60	Add Research Assistant	8,500	8,500		8,500	202,163		198,563		219,000	20,437	8,500	0	-8,500
60	Add Equipment	6,500	6,500		6,500	208,663	5,200	199,863		219,000	19,137	1,300	0	-1,300
60	Add Supplies	125		125	125	208,788		199,988		219,000	19,012	125	0	-125
60	***Term Three***													
50	Lose FTEs	-34,000				208,788		199,988	-34,000	185,000	-14,988	0	-3,400	-3,400
50	Add Supplies	95		95	95	208,883		200,083		185,000	-15,083	95	0	-95
50	Add Supplies	135		135	135	209,018		200,218		185,000	-15,218	135	0	-135
50	Reduce Clerical Help	-2,885	-2,885		-2,885	206,133		197,333		185,000	-12,333	-2,885	0	2,885
50	Ending Balance		180,500	28,518	209,018	206,133	8,800	197,333	15,000	185,000	-12,333	33,268	15,000	-18,268
50	Net Change		41,500	568	42,068	39,183	8,800	30,383	15,000	15,000	-15,383	33,268	15,000	-18,268

Notes:

Summary:

Four-Tier Full Cost	**Costs**	**Revenues**	**Breakeven**
Tier-One Costs	$195,133	$185,000	-$10,133
Plus Debt-Related	0		
Tier-Two Costs	195,133	185,000	-10,133
Plus Noncapitalized	0		
Tier-Three Costs	195,133	185,000	-10,133
Plus Depreciation	2,200		
Tier-Four Costs	197,333	185,000	-12,333

The transactions increase total fixed costs and total variable costs. In the four-tier full-cost calculation, only the depreciated amount shows up as cost. Therefore, on a five-year useful-life basis, the amounts not depreciated this year must be omitted, thus reducing costs. Enrollment first rises, then falls the same for marginal costs. Research grants increase marginal revenues. Enrollment-driven revenues decrease marginal revenues.

An Alternative to Traditional Cost-Recovery Accounting

An interesting response to the Circular A-21 dilemma is the Phoenix plan, a proposed indirect-cost-recovery procedure that would replace the present cumbersome negotiated reimbursement system with one that uses fixed-rate cost allowances.[7] These cost-allowance rates would of course depend on certain key cost definitions. The quite revolutionary Phoenix plan would simplify cost-recovery accounting and relegate it to the special-case status it deserves. Above all else, it or any similar simplified system of cost recovery would eliminate the need for what in many universities is now a second full-fledged cost accounting system. At this writing, the Phoenix plan is very much in the exploratory and developmental stage and, like any new idea, has already received criticism from institutions that prefer the status quo.

Costs and Total Quality Management

As organizations become larger and more complex, it is more difficult to ensure uniform quality in the products and services offered for sale. The concept of statistical quality control arose to a large extent as a means of minimizing the number of defective products and the commensurate costs resulting from scrapping them. As production processes became more fully automated, the danger increased for design flaws to be multiplied manifold, often at enormous cost. Massive product recalls in the automobile industry are a classic illustration of this phenomenon.

Every generation of managers, management consultants, and organization theorists feels that it must put its own unique stamp on the world around it. The emergence in the 1980s of the concept of total quality management (TQM) in business and higher education may be a case in point, since the ideas of quality control and of managing for quality were certainly not entirely new at the time.[8] The new focus in TQM was on at least four factors:

- Customer satisfaction and customer relations
- Teamwork
- Measurement of results
- Continuing efforts at quality maintenance and improvement

Customer satisfaction is central to TQM. In all highly competitive situations, customers can be lost even if product or service quality is unimpaired. How and how timely products reach customers are important concerns. Is product or service differentiation real or only a figment of the institution's imagination? In TQM, the concept of the customer is expanded to mean external as well as any internal users of an organization's services. The term "total" in TQM means that every activity within an organization must be touched by the management of quality.

Since colleges and universities incessantly maintain that they manage quality, TQM should not really be all that novel. But since quality in education is difficult to measure, maximizing service quality within the context of optimal costs may be especially difficult in higher education. Another obstacle to fully implemented TQM is the very decentralized nature of executive decision making.

Most service-rendering activities are based on teamwork, and ensuring service quality requires that one pay attention to how well teams perform. TQM could just as well be called "team quality management." But how do you determine whether or not a team performs well? A vast and growing literature is devoted to this and related questions. One recurring theme is that one must set objectives and develop performance indicators and measures. As a result, TQM is becoming highly quantitative, a fact that can create difficulties in service organizations where service quality is often intangible. Nevertheless, the focus must be on performance measures, and costing is a major measurement technique in TQM.

Total Quality Management Equals Total Cost Management

The types of costing most relevant here are those described in chapters 6 and 7, especially costing tasks designed to achieve cost-effective management results throughout the organization. TQM equals total cost management. The emphasis is on cost-effectiveness and not necessarily on minimizing costs per se. The goal is to reach the cost level that best helps achieve the organization's objectives and mission.

Therefore, how costs are managed throughout the organization is central to TQM in higher education and elsewhere. It is not sufficient that a few segments within an institution pay attention to cost-effective and customer-centered management of service quality, although that might be a start. The principal objective is that such management permeate the entire enterprise. If not, there is no TQM or total cost management.

Finally, TQM, like total cost management, must not only be a systemwide effort, but must be a continuous effort, unless the point of perfection has been reached. Absent such an ideal, TQM, like total cost management, requires detailed and dynamic planning. If total cost management is to take place within a TQM environment, every department, every manager, and every work team must know what it is supposed to accomplish, how specific objectives are to be achieved, how goal achievement will be measured, and perhaps most important, how individual and team efforts will be rewarded.

Conclusion

This manual focuses exclusively on different aspects of descriptive costing and on the many different answers that are possible when institutions try to determine the cost of a particular activity. Every organization must first learn to identify the costs of rendering its services, but it dare not stop there. It must continually ask itself what are the right costs. And there is no single answer to this question.

An extensive literature and numerous networks of professional expertise exist within and outside of higher education that can assist institutions in how to improve their total cost management efforts. The many costing examples mentioned testify to the fact that colleges and universities are well into aggregate and activity costing. The literature also makes clear that many useful costing concepts do not originate in higher education. Whenever this is the case, adaptation to higher education may be neither easy nor always possible.

It is rather trite to say that institutions should develop a total cost management plan, but without a plan it may be difficult to know whether the various costing efforts permeate the entire institution and whether they have a common objective. At a certain level, many higher education costing efforts seem to concentrate on nothing more than on staying within approved budgets. Most college and university budgets probably represent less the result of a TQM-driven total cost management effort than they do the result of a sometimes overwhelmingly political process. For better or worse, budgets represent an institution's business plan that tells all involved what costs will be. To the extent to which institutions can bring a TQM dimension to budgeting, they will also enhance the quality of total cost management.

Who Is Responsible for Cost Analysis?

Even the most highly sophisticated, whiz-bang, multiple-algorithm, cost-crossover marvel of an accounting system tells us nothing about how well, but only how, resources are being used. The design of a sound cost accounting system that furthers the cost-effective deployment of resources requires, among other things, a comprehensive activities-costing plan. Such a plan originates with an inventory of existing costing tasks and models. From such an inventory, the plan expands to include any missing costing endeavors and sets priorities of when and how these will be added to the overall system. This may bring us back to total cost management and TQM and to how each institution weaves the fabric of all of its myriad costing tasks. Regardless of their quantitative importance, how one allocates indirect costs is a secondary issue, but obviously included in the plan.

Depending upon the nature, size, and complexity of the institution, the professionals in charge of costing and planning the design of cost accounting may be the chief executive, academic or financial vice presidents, the provost, an academic dean, or some team charged with the task. When one studies the literature, some of the best thoughts have come from the academic side and from persons engaged in institutional research.

Because so much costing occurs at the operational level, non-academic department heads and their staffs carry out many of the most substantive and effective costing tasks. Often very little is known within the institution about these projects. Institutions place a lot of faith in their personnel, expecting that the "right" things will be done and that good cost decisions will be made. In planning a comprehensive cost accounting system, these discrete costing projects are often the most difficult to identify.

Finally, the solution may not lie in a grand scheme, but in a plan that embodies incentives for managers to identify and undertake the costing tasks that support the institution's most strategic and tactical current and near-term decisions. Strategic decisions point to where the institution is heading; tactical decisions indicate how it gets there. Cost accounting should serve both dimensions, but without overburdening the institution. Therefore, a practical plan will select key costing thrusts and will not try to do so much that in the end nothing gets accomplished.

Questions With Financial Policy Implications

Some of the financial policy considerations involving the costing of any institutional subcomponent are the following:

- How to distinguish between, variable, fixed, and marginal costs
- How to distinguish between operating and capital costs
- When defining capital costs, how to formulate realistic depreciation or capital-use allowance policies
- How far to go in promoting full costing and when not to do it
- When allocating direct and indirect costs, which allocation bases to choose
- Which and how fully to allocate support costs to primary programs, in specific applications and in the aggregate, under the new SFAS No. 117 rules
- Which activities to subject to continuing cost-effectiveness analysis
- How to monitor those who are charged with the cost-effective allocation of resources

This manual has touched on most of these issues. One principal aim has been to show that there are different ways in which the cost of a given cost center can be determined and that each way usually results in a different cost outcome. The manual also suggests that the term "activity" can have different meanings and that "activity costing" can have either a very narrow meaning or can involve very complex daily operations. Today we know more about the costs of very narrowly defined activities and less about those involving complex interactions among academic and administrative support departments. Increasingly, the more interesting costing tasks concern the latter.

Among the financial policy questions listed above, one could have included the distinction between direct and indirect costs. From the point of view of cost-effective resource allocation, knowing which are direct and which are indirect is not very helpful, however preoccupied colleges and universities have been with this distinction. What matters is how much personnel is being used in an activity and which departments contribute the personnel and at what cost. Beyond personnel, what matters also is the cost of all nonpersonnel resources needed. And finally, what matters is the nature and amount of the capital resources that come into play for each activity.

At present, macro-cost accounting, rather than activity costing, dominates college and university costing practice. This has made a virtue out of cost pooling, which is essentially an economy measure. Massive cost pooling makes the full costing of activities imprecise and rather more complicated than it needs to be. While macro-costing is where the budget games are played, micro-costing is where one can determine whether resources are used well. Micro- and activity costing are the future of college and university costing, because macro-costing and cost pooling reveal little about how cost-effectively resources are being used. Ideally, governing board members would like to be assured that activities are managed in a cost-effective manner so that the descriptive macro-cost reports indeed reflect the cost-effective use of the institution's resources at the grass roots.

Notes

1. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21. Reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994).
2. NACUBO and NCHEMS, *Procedures for Determining Historical Full Costs: The Costing Component of the Information Exchange Procedures*., 2nd ed., Technical Report 65 (Washington, D.C.: NACUBO and Boulder, Colo.: NCHEMS, 1977). NACUBO and NCHEMS, *Costing for Policy Analysis* (Washington, D.C.: NACUBO, 1980).
3. Charles T. Horngren and George Foster, *Cost Accounting: A Managerial Emphasis* (Englewood Cliffs, N.J.: Prentice Hall), chapter 21.
4. NACUBO and NCHEMS, "Drake: Instructional Capacity," chapter 5 in NACUBO and NCHEMS, *Costing for Policy Analysis*.
5. Stephen A. Hoenack et al., "The Marginal Costs of Instruction" in *Research in Higher Education* 24:335.
6. NACUBO and NCHEMS, *Costing for Policy Analysis,* 43.
7. "Progress Report on the Phoenix Project," internal memorandum for Council on Governmental Relations, September 28, 1995. "A New Concept in Indirect Costs: The Phoenix plan," draft memorandum for Ad Hoc Group of University Business Officers, May 21, 1995.
8. See Dennis C. Kinlaw, *Continuous Improvement and Measurement for Total Quality* (San Diego, Calif.: Pfeiffer & Co., 1992).

— Appendix A —

Basic Costing Concepts and Principles

The literature on costing is vast, and college and university administrators and managers are by and large well-acquainted with those of its elements directly related to their areas of responsibility. A summary of basic concepts and principles are presented in this appendix and may be of interest to less expert readers.

Types of Costs in Cost Accounting

Hyatt's *A Cost Accounting Handbook for Colleges and Universities* and *College and University Business Administration* defines several cost concepts in use in higher education.[1] The first distinction is between "economic" and "accounting" or "explicit" costs.

Economic Costs

Economic costs are defined as the dollar value of the resources used in the production of goods or the rendering of services plus the value of the alternative outcomes given up, called opportunity costs. Opportunity costs are also associated with forgone profits, forgone investment return, or forgone revenues. In higher education, they often refer to income not realized, as well as to educational programs (i.e., courses, research projects) not undertaken.

Higher education opportunity costs are not easily quantified. In the face of competing investment alternatives, it may be difficult to identify which specific opportunity has been sacrificed. It may be more practical to see opportunity costs as a forgone return on investment, which can be quantified. On the whole, the topic of opportunity costs for higher education activities is not only complex but, for practical costing purposes, quite intractable. In spite of numerous references to the subject, an authoritative theory does not exist on how to apply the opportunity cost concept systematically to higher education.[2]

Explicit Accounting Costs

Economists like to think that their definition of costs is the most precise, with or without opportunity costs. In practice, however, even their explicit-cost concept—resources actually used and/or used up—can have diverse meanings within higher education. A final economic cost figure depends on management's choice of definitions, on the values given to different types of assets used in the production process, on the specific costing conventions adopted, and on the ever-changing cost accounting requirements imposed by laws, regulatory agencies, providers of funds, and cost accounting standard-setting bodies.

The costing applications described in this manual are limited to the explicit costs identified by the institution's cost accounting management information system (MIS). In general, these costs equal the historical values of the resources used or used up in the rendering of the institution's services.

Inflation introduces one of many complications to costing. Historical values of long-lived physical resources are less than the cost of replacing them. Some institutions are using replacement values instead of historical values for some of their costing applications. Others are including provisions for inflation in long-range purchasing and employment contracts when future costs must be reflected in current costing applications. While the historical cost accounting MIS database predominates in higher education costing, some applications may have to take into account the cost of inflation.

The Most Commonly Used Explicit-Cost Types in Higher Education

Among the many different types of explicit accounting costs, the following are used throughout this manual:

Variable costs are costs that vary with changes in enrollment, sales, or output.

Fixed costs are costs that do not change with changes in enrollment, sales, or output.

Total costs (TC) are the sum of variable plus fixed costs.

Average costs (AVC) are total costs divided by some measure of output q; normally expressed by the equation $AVC = TC/q$. Also called mean or unit costs.

Marginal costs (MC) represent the change in total costs resulting from a corresponding change in output; normally expressed by the equation $MC = dTC/dq$, where d stands for change.

Direct costs are costs clearly caused by or associated with a specific cost objective or activity.

Common or shared costs are costs associated with something—a piece of equipment, a classroom—used by two or more cost centers. Sometimes called indirect costs.

Pooled costs are costs which the accounting system records in one account or pool rather than allocating them to individual cost centers. Both direct and indirect costs can be pooled.

Indirect costs are all institutional costs not directly caused by or associated with a specific activity or program.

Overhead costs are costs such as utilities, custodial services, certain types of insurance, supplies, and general maintenance without which a specific activity or program could not be carried out properly. Some overhead costs are direct and others are indirect.

Cost center or cost objective is an entity, program, or activity whose cost is to be determined.

Joint costs result when a given cost input or process yields two or more outcomes.

Costing as Art Rather Than Science

In spite of a near general consensus on basic cost concepts and costing standards, college and university costing practices still are more art than science. Behind the veil of promulgated standards and mandates, a lively costing practice exists that is distinguished by its lack of uniformity. This is not an indictment. On the contrary, the current state of costing testifies to a dynamic search within higher education for ever more-precise answers to a vast list of cost questions. In their costing practices as well as in the pursuit of their missions, institutions tend to look out for their own interests. They should not be blamed when they go their own way, where they are permitted to do so, if their financial policy preferences require a unique approach.

Costing practice is highly developed at many colleges and universities, especially among those who depend in significant ways on current revenues from indirect cost recovery. For such institutions, cost recovery is more than a financial indicator. It is a proxy for their very character, the image of quality they project, and the special role some of that research plays in the fortunes of the nation.

Prowess in cost-recovery accounting is no guarantee that other costing endeavors are handled well. Institutions that are deeply absorbed in research-related indirect-cost-recovery costing may still be limited in how far sound costing practices reach into the remainder of their enterprise: the cost-effective allocation of resources. Even more fundamental is that some cost-recovery costing standards and mandates are not an appropriate basis for an institution's overall costing efforts.

Institutions should have a clear financial policy basis for their costing efforts. In this sense, many institutions admit openly to a lack of costing expertise. Actually, very little is known about how well colleges and universities carry out their costing tasks. More important, perhaps, even less is known of any beneficial effects costing has on how colleges and universities allocate their resources.

Limited Suitability of the By-Function Chart of Accounts in Costing

It is no secret that the by-function financial accounting system that colleges and universities use for budgeting and financial reporting has never been suitable by itself for costing tasks that assist in the cost-effective allocation of resources. Such costing tasks require a highly developed and often specialized micro-cost accounting MIS.

Macro-costing is essentially descriptive and was never intended to reveal whether or not resources are used efficiently. The by-function accounting system, even if modified by SFAS No. 117, is inadequate for this purpose. A major challenge is to choose the best among the numerous cost allocation possibilities, and the appropriate choice is closely related to the degree of precision one expects from a particular costing task.

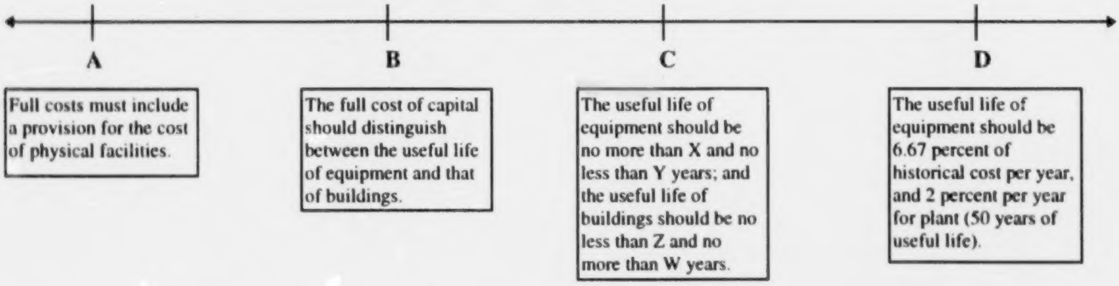
Degrees of Precision in Macro-Costing

In computing the types of macro-costs implied by the charts of accounts shown in chapter 1, even the most highly developed cost accounting MIS leaves ample room for doubt concerning the degree of costing precision that can or should be achieved. Even generally accepted or mandated costing standards offer no guarantee of uniform or consistent cost results.

Other things being equal, mandated costing standards--those promulgated in OMB Circular A-21, for example—should theoretically lead to uniform costs. But this is not the case in most current applications. Generally accepted costing standards, often vaguer than mandated ones, tend to leave much to the costing practitioner's imagination and discretion. Vagueness in costing standards is a natural phenomenon and should not come as a surprise.

Figure A.1 illustrates varying degrees of vagueness and precision in the formulation of a given costing standard.

Figure A.1: Range of Precision in Costing Standards with Examples of Standard Descriptions



A: Full costs must include a provision for the cost of physical facilities.

B: The full cost of capital should distinguish between the useful life of equipment and that of buildings.

C: The useful life of equipment should be no more than X and no less than Y years; and the useful life of buildings should be no less than Z and no more than W years.

D: The useful life of equipment should be 6.67 percent of historical cost per year, and 2 percent per year for plant (50 years of useful life).

At one extreme, A is a relatively benign and an obviously flexible requirement. At the other extreme, D, the standard is explicit and non-negotiable. In many costing applications, costing practitioners must invent their own rules or standards.

Allocation practices are fertile ground for differences in approaches that cause differences in costs. If one wants precision in costs, one first needs precision in the decision rules that guide the costing effort. And if one wishes to compare costs among institutions, the costing rules used by the participants must be as nearly identical as possible.

In cost accounting for both business and higher education, precision comes at a price. Costing in general should be carried out in an economically feasible or reasonable manner. The idea of cost pools was invented for this reason. Rather than detailed tracking, accountants long ago looked for methods that help distribute portions of a pooled stream of costs to the numerous cost centers.

Rather than settling for a free-for-all, the profession began to favor the adoption of allocation standards. So it is within these standards that one must look for the highest precision in costs. But data processing has advanced rapidly during the last two decades, and the pace of change is accelerating. Therefore what was economically onerous only a few years ago may now be well within an institution's technical and financial capabilities. Cost allocation principles discussed in chapters 4 through 7 illustrate this point.

In Whose Interest Are Costing Standards Promulgated?

Externally imposed standards are not always in an institution's best financial interest. For instance, Circular A-21's rules are intended not so much to help maximize institutional cost recovery, as to help contain the government's reimbursement costs. Many federal agencies that promulgate cost-recovery rules for colleges and universities often apply more generous—financially more rewarding—standards to for-profit enterprises. Private funders of research and sponsored college and university activities may also have more liberal standards that safeguard institutional financial integrity.

Other external standards are designed to enhance cost comparability among institutions. A lack of precision or consistency in the inter-institutional application of standards and cost definitions can defeat this objective. For meaningful intercollegiate cost comparisons, standard uniformity may not be enough: The underlying financial policy directives may also have to be the same. Depreciation cost accounting is a prime area where the absence of a precise standard may make cost comparison meaningless or at least less useful.

While costing standards serve higher education as a whole, institutions should apply them without sacrificing their most enlightened self-interest.

The Difference Between For-Profit and Not-For-Profit Cost Accounting

Textbooks on cost accounting are written principally from the perspective of for-profit manufacturing enterprises and increasingly from that of for-profit service enterprises. Beyond the sources mentioned here, no comprehensive formal textbooks exist on college and university costing. Moreover, formal cost accounting textbooks tend to be lengthy tomes, touching on many intricate details. While taking at least a moderate textbook approach, this manual is quite selective.

Not-for-profit accounting is in some respects different from business accounting. Noteworthy are the different perspectives public and independent institutions bring to the task of accounting in general and to cost accounting in particular. A major deviation from for-profit accounting is the absence of a clear bottom-line concept that acts as a financial performance measure. SFAS No. 117 corrects this deficiency significantly, but still does not achieve a clear bottom line. The requirement by governing boards on management to balance the budget is obviously not a very precise financial goal. Yet, whatever real or imagined differences there may be, not-for-profit cost accounting is fundamentally the same as for-profit cost accounting. The same basic cost concepts and costing principles discussed in texts on for-profit business cost accounting apply to not-for-profit activities in general and to colleges and universities in particular.

Sometimes, applying for-profit costing principles to higher education will prove to be more difficult if not controversial. The chief difficulty lies in how one defines higher education products and outcomes, but this is not of concern in macro-costing.

From Where Do Costs Get Their Meanings?

Costs derive their meanings from the law, from evolving industry consensus, and through experimentation.

Costs Are Legal Fictions

In practice, every costing endeavor is based on arbitrary, more or less precise, and frequently discretionary definitions and interpretations. A basic reason is that all economic facts are first and foremost legal "fictions." In modern society, no economic event exists without an underlying legal context. This context changes continuously. Higher education has experienced several such changes in recent years. Three of the most striking recent examples are (1) the requirement for the independent not-for-profit sector to account formally for the depreciation of long-lived assets, (2) the recent changes in SFAS No. 117, and (3) the latest changes for Circular A-21.[3] One of the most famous (or infamous) legal fiction examples is, of course, Circular A-21 itself.

Among those promulgating "legal accounting and cost fictions," the following stand out: the Government Accounting Standards Board (GASB), the Financial Accounting Standards

Board (FASB), the Cost Accounting Standards Board (CASB), the American Institute of Certified Public Accountants (AICPA), the Department of Defense (DOD), the Department of Health and Human Services (DHHS), the Internal Revenue Service (IRS), and many other federal, state, and private entities that issue definitions of what they mean by costs. It is not surprising when uniformity is not always evident in the pronouncements of these bodies and the resulting applications.

Costs As Political Tools

Legal definitions aside, many types of costs have political connotations. The underlying cost definitions and models are not always the result of objective, logical, or scientific analysis. And, perhaps more interesting, some costs are used as political tools.

Specific costing outcomes depend on who undertakes or supervises a given costing task. Most, if not all, costing standards are preceded by consensus-making. Consensus-making is a political process whose success depends on compromises and accommodation. Institutions at times undertake cost studies that must undergo internal political accommodation. This is the case when cost models need employee or other constituent support.

Cost data must not only be accurate in legal and mathematical terms, it must be credible in the eyes of those affected. This means that at times managers may have to create cost models that are not completely in tune with what other institutions are doing. Ideally, generally accepted or mandated costing methods should not be sacrificed to internal politics. In internal or external political terms, the purposes for which costing tasks are carried out matter.

What Are the Purposes of Cost Accounting?

The following purposes, highlighted in current literature and in the original Hyatt handbook, are among the most noteworthy:

Pricing

Colleges and universities set external and internal prices. The best-known external prices are tuition and charges for room and board. Internal prices, sometimes called "transfer prices," include the various charge-backs, proratings, and transfers of costs among departments. The cost information needed for a tuition pricing decision is obviously quite different from that required by the plant maintenance department when it prices the repair of a broken dormitory window.

Budgeting

Annual operating and capital budgets represent the institution's financial plans for human and material resources to be deployed during the academic or business year. These budgets reflect, but are not entirely identical with, the institution's current costs. Budget decisions play a fundamental role in whether or not available resources will be allocated in a cost-effective manner. Some budgeted expenditures—debt repayment, for instance—are not costs per se. Therefore, budgets alone do not give an accurate picture of institutional costs.

Indirect Cost Recovery

Indirect costs play several roles in higher education cost accounting. The most striking derives from the fact that indirect cost recovery is a major revenue source for an important segment of higher education.

Determining a research program's indirect costs is essentially a pricing decision: How much should or can a project sponsor be charged for the use of personnel and facilities? For the nation's major research and doctorate-granting universities, indirect-cost-recovery costing has a very high profile among the various costing purposes listed here. In the large number of undergraduate institutions, indirect costing for cost recovery plays a minor if any role.

Cost Control and Cost Management

Cost control is a universal role of costing. This involves, among other things, a comparison of incurred costs with budgeted costs, an analyses of the causes of variance between the two, and decisions about likely corrective actions. In all probability, resource allocation can always be improved, and the management of costs can reasonably be considered an essential and never-finished managerial task.

Long-Range Planning

Cost information is central to how institutions allocate their resources over time, change programs and facilities, and implement long-term missions. Strategic costing enters the picture when institutions study alternative resource combinations and their long-term cost/benefit implications. Where current pricing and budgeting looks at costs in historical terms, long-range planning looks at costs in terms of future and strategic consequences.

Managerial or Institutional Performance Evaluation

Costing plays an important role in testing not only how management has deployed resources, but in assessing what this deployment has accomplished. Because the effectiveness of academic programs is not always easily quantified, academic performance evaluation may entail complex, sometimes lengthy, and at times controversial cost studies. Whether directed toward academic or nonacademic activities, costing is one of the principal tools for corrective action. Such action, in turn, has its own future cost implications.

Total Quality Control and Total Quality Management

College and university missions are essentially qualitative endeavors. A key question is how an institution can best use its human, material, and financial resources. On paper at least, a given educational mission can be achieved through a variety of resource mixes. In practice, one must start with the mix at hand. Higher education is frequently criticized for alleged inflexibility in how it allocates resources. Examples include static faculty-to-student ratios and inflexible academic calendars.

Ideally, institutions will want to articulate and quantify their preferred outcomes. The principal ones will be educational, but many can be expressed in financial or other quantitative terms. Managers will try to determine the current and future costs of these outcomes. Then they will determine whether or not these outcomes might be achieved at less cost. Ultimately, they must decide whether and when to implement a specific lower-cost alternative. Maintaining and enhancing service quality without raising costs is a perennial challenge. The complex task of managing both quality and costs is the concern of total quality management.

Costing and Productivity

It has been alleged that higher education productivity has remained essentially static, that the relationship between resource input (costs) and institutional outcomes (benefits) has been constant. If this is true, has there been no change in the quality of either higher education inputs or outputs? Are we teaching the same way today as 50 years ago? Are we teaching the same things? Difficulties in measuring higher education productivity notwithstanding, costing can help answer important policy question that relate to educational productivity.

What Is the Difference Between Cost Accounting and Cost Management?

The overarching purpose of a sound cost accounting system is to facilitate cost management. Cost management requires management's understanding of what causes a given cost's particular level and long-range tendency. This understanding comes from appropriate historical, structural, and substantive analyses of costs. Historical cost analysis helps identify cost indicators which are useful by-products of a sound cost accounting system. Managers routinely use, update, and apply them in budgeting and long-range planning.

The Need for Historical Cost Data

In order to manage costs effectively, it is normally necessary to have a sense of historical cost trends. The historical cost accounting MIS provides the data that shows changes in costs and cost structures over time, giving management a sound foundation for its decisions affecting current and future costs. Good data analysis of causes and effects is the basis for rational resource allocation decisions.

When accounting and costing practices undergo significant change, time series are interrupted. When this happens, past cost data must be adjusted to show consistent and accurate long-range cost trends.

Costing applications that center on cost-effective resource deployment are directed toward operational micro-cost, rather than macro-cost, issues. When institutions begin detailed operational cost studies, they do not always have at hand the financial resources to immediately develop adequate historical cost benchmarks. Over time, consistent periodic cost studies create their own cumulative historical database. Expensive studies of past costs are not always necessary and may, in the short-term, waste scarce financial and human resources.

Cost Management and Budget Control

There is some confusion in higher education and in other nonprofit institutions about the difference between cost management and budget control. Budget control is cost control only when the many individual budget allocations are the result of prior careful costing studies that directly lead to a more cost-effective allocation of resources.

Management is expected to implement a least-cost or a most-cost-effective allocation of resources. Normal budgeting processes offer no guarantee that this will be so. NACUBO's annual awards for cost-effective resource reallocation testify to the fact that certain costing efforts can affect budgets dramatically. Nevertheless, an institution's claim that it operates cost-effectively because it meets its budget target should be accepted skeptically; there is probably ample room for improvement. Many higher education budgeting practices resemble those of governments and thus do not always inspire confidence when it comes to minimizing costs.

Therefore, controlling the budget is cost management to a limited degree only. Cost management means making the best resource allocation decisions before appropriating the numerous object line item budgets. Once budgets have been agreed upon, costs are essentially "in the bag." Institutions which are preoccupied with budget control may miss crucial opportunities for cost management.

Cost Accounting, Cost Management, and the Organization Chart

Cost accounting is normally seen as a subset of an institution's general accounting work. In higher education, the accounting function tends to be the responsibility of the chief business or finance officer. In contrast, the cost management function is normally decentralized across all operating departments and budgets. While the accounting office may play a role in most cost studies, many are the responsibility of and originate with the various operating and academic units. Provosts, academic vice presidents, and deans manage and control an enormous range of human and physical resources and thus determine and control costs. How cost-effective are their management decisions?

Higher education traditionally distinguishes between two broad cost management areas: academic programs and services and all nonacademic activities. The normal collegiate organization chart divides these two realms into several administrative domains, and depending upon institutional size and complexity, may further subdivided them. A chart of accounts gives at least an idea of the proliferation of costing responsibilities. In recent years, the number of individuals responsible for budget and cost management has multiplied in both areas.

If one compares budget control staffing at two organizations, one a small institution and the other a university of moderate size, the small institution, with a smaller staff and budget, has a potentially less arduous task defining and controlling these responsibilities. The university must supervise the cost management responsibilities of many more individuals. It is much easier to define an individual's cost management responsibilities than to ensure proper cost management in every budget responsibility center. How does one know that an individual is qualified to manage costs beyond the relatively mundane task of staying within budget? A cost accounting system is not complete without safeguards that not only guarantee proper cost controls, but also place a high value on the cost-effective allocation of resources throughout the organization.

Summary

An institution's cost accounting MIS is one, if not the most important, element of its total financial management information system. The cost accounting MIS is a subset of the financial management information system.

A sound cost accounting MIS tells management—

- how resources have been allocated,
- whether the allocation is cost-effective,
- what the costs of alternative resource-allocation schemes are, and
- how its costs compare to those of other institutions.

Such a cost accounting MIS should be flexible. It should accommodate a variety of cost studies and costing approaches.

Cost accounting should not be undertaken for its own sake, but for the benefit of managers who need decision-specific cost information. Cost accounting and costing are not discretionary, except perhaps in whether they ought to be developed.

While costing practice may differ between colleges and universities, between large and small institutions, or between public and private institutions, the ultimate test is in how accurate costing outcomes are and in how an understanding of costs helps institutions achieve their objectives.

Notes

1. James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983). Deirdre McDonald Greene, ed., *College and University Business Administration*, 5th ed. (Washington, D.C.: NACUBO, 1992).
2. Stephen A. Hoenack and E.J. Collins, eds., *The Economics of American Universities: Management, Operations, and Fiscal Environment* (Albany, N.Y.: State University of New York Press, 1990), chapters 1, 5, and 7.
3. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for-Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993). Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21; reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994).

— Appendix B —

Cost Allocation Bases and Procedures

This appendix elaborates on several allocation issues discussed in the body of this manual. Cost allocation has been defined as procedures used when pooled costs are distributed to individual cost centers. Pooled costs are either direct or indirect costs. Higher education and general costing literature acknowledge that many so-called indirect costs are in fact unallocated direct costs. As a result, there is increasing talk about and movement toward maximizing the direct costing of all pooled costs.

When cost centers trade with one another, the resulting debits and credits transfer costs among them. When two or more cost centers benefit from common services, they have to share these costs in some proportion to the services each receives. Whenever an institution creates cost pools, many costing tasks require that these pooled costs be eventually distributed among cost centers in some fashion.

Allocation Procedures for Pooled Costs

The two principal types of cost allocation procedures are—

- internal pricing, charge-backs, and similar procedures, and
- percentage allocation or lump-sum prorating procedures applied to pooled costs.

Variations of internal pricing are used in both direct and indirect costing. Percentage allocation and lump-sum prorating are the principal methods for allocating pooled costs.

The Market Price Base

External market prices tend to be perceived as the most equitable and most practical basis for direct and indirect costing. They have several advantages, especially when the institution can negotiate discounts for large orders or can pay wholesale prices. Other advantages are that the costs charged are credible and that managers are discouraged from bypassing the system in search of lower external prices.

One serious disadvantage is that internal suppliers—normally, purchasing departments—cannot pass on at the market price their other costs that derive directly from managing the services or materials provided. As a result, much internal pricing tends to be markup, or cost-plus, pricing. The supplier transfers not only a cost equal to the market price of a product or service, but adds a supplemental charge for such things as freight, handling, departmental overhead, and whatever else the supplier is able or permitted to charge. Without a clear policy for calculating markups, cost-plus pricing can easily acquire a bad reputation.

Market pricing can be carried out on a per order (or per delivery) basis or by the batch, often in the form of monthly charges. The first method, where the price of each delivery or transaction is charged when it occurs, is preferred. In the batch method, the charges are pooled during each accounting period—normally a month—and then charged out in one single accounting transaction as a lump sum. By-the-batch cost transfers will reflect average prices. Individual transactions are recorded in supporting ledgers that may not always be available to affected managers.

The Cost Basis

This method of transfer pricing is used most frequently when one department provides services or produces a product for another. Three approaches can be found in college and university costing and budgeting:

- Direct costs only
- Direct costs plus a surcharge for a portion of indirect costs
- Direct costs plus a surcharge for a department's full costs

The last two methods are variations of cost-plus pricing, but with considerably larger surcharges. These come about when the surcharges include all administrative overhead, debt service, and other capital costs not directly associated with the activity in question, but still part of the charging department's total cost. Surcharges must be logical and credible.

Ideally, institutions should let service departments charge their total costs, leaving them with a zero cost balance at the end of the year. In practice, many service departments charge out less than their total direct costs. A perennial tug-of-war exists between academic and support departments in the competition for funding. When institutions succumb to internal political pressures and routinely let support departments charge academic users only a portion of the total costs associated with supplies, materials, and services, it should come as no surprise when the long-term funding of support activities suffers, as many institutions claim is more and more the case.[1]

The Negotiated Price Base

Negotiated prices are determined jointly by the selling and acquiring departments or, more broadly, on the basis of an administrative decision. This allocation base is used when there are no competitive market prices with which to compare internal charges. It is also an appropriate base when there are legitimate questions about how a cost-based price should be set.

Arbitrary Cost Price Base

This frequently used base should have logic to it and not be pulled out of thin air. For instance, deciding on a 2 percent plant depreciation rate is arbitrary, but could be defended because a textbook mentioned it or because everyone agrees that physical plant has a 50-year life before major renovations are needed.

Although internal or transfer pricing in any of the forms described above can become cumbersome, its conceptual simplicity is its principal advantage: If a service or product can be priced, the internal buyer should be charged that price directly. Theoretically, every internal transaction can be priced. So, if prices are set high enough, direct and indirect costs, variable and fixed costs—total full or long-run costs—can be charged to users.

A going concern must sell enough output at a price that covers total costs. Service departments can be seen as internal going concerns. Therefore, why should they not earn enough income to defray their total costs? Under this rule, service departments will sell to user departments enough services at prices that cover their total costs.

Once colleges and universities have mastered the art of internal full-cost pricing, they are freed from the complications that cost averaging and the near-endless permutations associated with most non-price-based indirect-cost allocation procedures entail.

The Affinity Principle

The affinity principle implies that there should exist a cause-and-effect relationship between the cost being allocated and a particular allocation base. The following examples imply such a logical relationship:

- A department purchases supplies whose cost is charged directly to it. Direct costing always demonstrates affinity.
- Pooled travel costs are allocated in proportion to either personnel compensation or the percentage of staff who incurred the travel costs. Personnel compensation, unless limited to staff who travel, is a less precise allocation base than the percentage of personnel causing the travel cost—without travel by staff there is no travel cost.
- Plant custodial services costs are a function of the time it takes to clean a specific facility. Both the square footage cleaned and a factor combining the length of time and the square footage cleaned will demonstrate affinity. Because some spaces take longer to clean than others, a time-weighted square-footage allocation base will produce a more precise cost result.
- The cost of plant depreciation is charged to a department on the basis of square footage occupied. Again there is a logical relationship between the physical space and its depreciation cost.

Some allocation methods in use in higher education and elsewhere violate the affinity principle. The most glaring example cited in non–higher education accounting literature is the use of direct costs as an allocation base. Seldom, if ever, are pooled costs related in a logical or cause-and-effect manner to direct costs, especially when the latter comprise, as they normally do, a mixture of personnel, consumables, and even capital cost elements.

For instance, Circular A-21 and the original Hyatt handbook cite direct costs as a legitimate allocation base.[2] Hyatt checks off direct costs as appropriate for almost every occasion, but then questions the degree of accuracy of the resulting cost allocations. Here, institutions are urged not to use direct costs as an allocation base unless mandated by an outside agency.

What is a suitable allocation procedure in one instance may not be appropriate in another. The choice must be based on the institution's underlying financial policies and on the degree of cost precision sought. The affinity requirement is critical for support-cost allocation where it is often tempting to use simplified methods that do not always meet the affinity test.

Many indirect cost allocation practices result in questionable cost data. Precise cost information is important in competitive situations, and thanks to improved computer-based cost allocation accounting technologies, for-profit and not-for-profit organizations use direct costing more frequently than in the past. The predominance of indirect-cost-recovery costing based on extensive cost pooling has discouraged more comprehensive direct costing in some segments of higher education. The compelling need for better cost data is pushing institutions into new directions. One result is that in both the for-profit and the higher education sectors, the number of affinity-based cost allocation procedures is increasing.

Economic Feasibility

The traditional reason for cost pooling has been the fear that direct costing is too expensive and too complicated. The idea was to simplify costing: Instead of allocating vast multitudes of small accounting transactions in a complex scheme of cost crossovers, pooling is supposed to make possible a more economical cost dispersal among cost centers.

There is considerable historical justification for this position. However, the dramatic advances in computer technology makes the economic-feasibility constraint a less valid argument today than in the past. Nevertheless, economic feasibility remains a consideration. A comprehensive cost accounting management information system (MIS) plan must include cost estimates for the system's implementation. Such a plan would indicate the point at which an economic constraint will kick in, indicating when the institution should shift from direct costing techniques to percentage or rule-of-thumb allocation procedures.

On occasion, institutions may exaggerate the difficulties and estimated costs of installing a comprehensive system of direct costing. Although there are fewer technical obstacles today, a change to comprehensive direct costing presents institutions with programming and phasing-in costs. This can be a serious short-term cost issue, especially for very large and complex institutions, but the short-term pain will be minor compared to the long-term rewards: Subsequent costing outcomes become more precise, simpler to implement, and may also be more consistent for comparative costing.

Who Has Control Over Costs?

Ideally, a cost accounting system should enable managers to precisely identify every direct cost element associated with a given cost center. Managers are responsible for the costs of their activities, they understand direct costs best, and they are aware that these are the costs they must control.

But this control is not complete. When a manager buys services from other departments, who determines the prices these departments charge for their services and how these prices are set? Can a manager go outside and buy for less? If a manager must buy internally, what assurance is there that the services bought are rendered in a cost-effective manner?

And then there are the truly indirect and support costs over which a manager has no control at all. Who determines the amounts of such costs that are to be charged to a given course, research project, department, academic division, school, or campus? Is this decision made by the auditors, by a single individual at the institution, by a committee? Once one knows who makes the decision, how are these charges computed?

Figure B.1 dramatically shows the number of costs that may affect the cost of a given activity but are the responsibility of other persons. Managers are more likely to accept even exorbitant-looking cost charges if they know that all other managers are doing their best to minimize their costs. The institution's top management may also want to impress upon others in the organization that significant general administrative and operational costs exist that must be covered by the institution's cash flow and current revenues. When such indirect costs, over which a manager has no direct control, are allocated, even simplified allocation procedures must be understood and made credible.

Primary and Support, Core and Non-Core Costs

Figure B.1 also illustrates that there is a hierarchical order among costs in the sense that each primary cost center has its distinct support costs. It also illustrates the complexity of the primary–support cost interdependence among institutional activities. Cost allocation procedures should help clarify rather than obscure this interdependence. Managers must be made to understand how and which types of common and support costs are being allocated to their activities.

In one of its more significant innovations, SFAS No. 117 stipulates that institutions must henceforth report their expenses—here, costs—by primary programs.[3] At this writing there is no clear consensus on what this means. Institutions will have considerable freedom in identifying their primary programs.

Institutions must focus on their primary programs because it is important that they know which of these cover their full costs and which do not. Assuming that an equitable process exists for allocating current revenues to primary cost centers, going-concern costing under the four-tier full-cost model and within the SFAS No. 117 framework of reporting will show which primary cost centers are going concerns in their own right.[4]

Allocation Bases for Pooled Costs

The allocation of pooled costs requires (1) a definition of the type of cost to be allocated, (2) a decision on how precise the resulting cost information must be, and (3) a choice among appropriate allocation bases.

There are four generic types of allocation bases:

- Personnel, personnel compensation
- Facilities or space
- Equipment, technology, machinery
- Services or usage

Figure B.1: Hierarchy of Primary and Support Activities

If instruction and sponsored research are the primary activities, the following are sources of support costs:
Public Service
Academic support
Libraries
Academic computer services
Student services
Institutional support
Operations and maintenance

If student recruitment is the primary activity, the following may contribute support costs:
Undergraduate and graduate admissions
Student records, registrar
Student financial aid administration
Faculty involved in recruiting
Publications and printing department
Office services
Custodial services
Catering
Alumni (recruiting) relations
Specialized professional services
Computer services

If a three-year fund-raising effort is the primary activity, the following provide support:
Trustees and alumni relations department
Development department
Public relations and publicity
Specialized professional services
Computer services
Financial administration

Every type of pooled cost can be allocated to cost centers on the basis of one or the other of these categories. One allocation base may be used for more than one type of cost, and some costs may use more than one allocation base. Figure 4.5 provides a partial overview of the types of allocation bases in use in higher education today.

Most for-profit accounting manuals stress only input measures as cost allocation bases. Higher education seems to favor the use of both input and output measures, in particular certain FTE and other student measures. Credit hours, degrees earned, and number of students graduating are all output measures. Circular A-21 mandated allocation bases are discussed in appendix C.

Mixing input with output measures confuses cost allocation bases with unit cost measures and constitutes a major lapse in methodological integrity. However, higher education does not seem to be troubled by such inconsistency.

Generalized Percentage Allocation Procedure

Most costing procedures that are not part of an internal pricing system rely on some form of percentage allocation mechanism. Normally, percentage cost allocation proceeds through the following steps:

1. Define the allocation task—for instance, allocating the cost of capital depreciation among specific cost centers.
2. Identify the fiscal policy constraint—for instance, the exact formula for calculating depreciation.
3. Choose the most appropriate, or externally mandated, allocation base—for instance, total or assignable square footage.
4. Determine each cost center's percentage share of the cost to be allocated—for instance, the percentage of square footage assigned to each cost center.
5. Multiply the dollar value of the total cost to be allocated by each percentage share. For instance, if the total cost is $2 million and one cost center's share of square footage is 75 percent, the allocation amount to that center is $1.5 million.

Chapters 4 through 7 provide numerous illustrations of how costs can be allocated and of how different allocation methods yield different cost results.

Major Allocation Bases for Pooled Costs

All the examples in this section start from the premise that interservice department tier-one costs—direct costs plus indirect personnel compensation plus consumables costs—have been fully allocated to support cost centers by means of appropriate micro-costing processes. The examples show how each of the major allocation bases can be used in non-price-based costing. In general, the objective is to allocate pooled costs to primary and support cost centers.

Theoretically, the use of a given allocation base indicates affinity. This means the allocation base best describes the relationship between the class of cost being allocated and the base proper, which is the predominant cause or source of that cost.

Personnel and Personnel Compensation as an Allocation Base

Personnel and personnel compensation—sometimes salaries and wages only—are logical allocation bases in all situations where there is a clear relationship between personnel or personnel compensation and the costs that must be allocated.

The distinction between personnel and personnel compensation is deliberate. Sometimes the number of employees affects a given support cost; this is the case in personnel administration and in a few logistical situations. Other costs, for instance staff benefits, depend at least in part on the size of the payroll. Sometimes the percentage of employees may be the most appropriate allocation base.

For many institutions, staff benefits are a cost that is pooled either by major function or as a single aggregate. A staff benefits factor, as a percentage of total salaries and wages, is a traditional higher education indicator used in budget planning. This factor is not identical across all functions, although it may be similar. Because staff benefits are a large cost component, small percentage differences in this factor may mean large benefit differences. A single average staff benefit factor applied indiscriminately to all functions will overstate some by-function post-allocation costs and understate others. Only direct costing of staff benefits yields precise personnel compensation cost data.

At the very least, institutions that continue to pool staff benefits should do so by function rather than in the aggregate, and the less aggregative that distinct functions are, the better.

On balance, and in the absence of external mandates, personnel and personnel compensation may be more useful allocation bases in activity costing than in macro-costing. Which support and indirect costs are truly a function of employment? The Hyatt handbook identified only three uses: executive management, fiscal operations, and general administrative services. Whether or not these functions are employee- or enrollment-driven—or more precisely, a combination of the two—is a legitimate question. When precision is not a paramount requirement in macro-costing and clear employee-driven support costs exist, the percentage allocation of support costs on the basis of either total compensation, salary and wages, or employee percentage shares seems to be justified.

Square Footage as an Allocation Base

Square footage is a versatile cost allocation base for most costs associated with the management of the institution's physical facilities.

A significant percentage of an institution's support cost is caused by physical facilities. The entire operations and maintenance (O&M) component of the educational and general (E&G) account and its equivalent for all auxiliary enterprises, hospitals, and independent operations may be subject to allocation on the basis of square footage. Another important example is the cost of depreciation. Two per-square-footage allocation bases exist: total square footage (TSF) and assignable (or usable) square footage (ASF). ASF requires a more complex space inventory than TSF. ASF refers to spaces actually occupied by faculty, students, administrators, and other employees, excluding circulation, custodial, mechanical, other common areas, and rest room facilities. The ASF approach is favored in Circular A-21 and similar, mostly micro- and activity-based costing situations. When the institution computes physical facilities costs for its own macro-costing purposes, the TSF base may be the most suitable. Since students have to reach their classrooms, staff must walk to their work spaces, and both will use rest rooms and common rooms, plant related costs should take into account these common areas.

Both the TSF and the ASF allocation bases normally produce different post-allocation costs. Aggregate ASF is always smaller than TSF. This does not mean that costs allocated on an ASF basis will also be lower, but they will always be different from those produced under the TSF base.

If the total value of depreciation to be allocated is identical for the TSF and ASF bases, not only is the total depreciation cost fully allocated under each base, but the ASF method actually imputes the depreciation costs of the "unassigned" square footage.

Since there is a difference between TSF and ASF, a situation may arise when a portion of depreciation cost will remain unallocated. This is the case when, in a building that is dedicated entirely to a science discipline, depreciation costs can only be computed on the basis of ASF after a percentage of depreciable value, equal to the difference between ASF and TSF, has been eliminated from the calculation of the depreciation charge. In other words, the TSF method would account for all depreciable assets, whereas the ASF method would allow for a lesser amount.

As simple as the square-footage allocation base may look at first blush, institutions need to be aware of the post-allocation cost differences implicit in the TSF and ASF allocation bases.

Perhaps the conventional wisdom, according to which square footage is an appropriate base for allocating depreciation costs, is an aberration. The truest measure for allocating depreciation costs may well be the relative percentage shares of the value of depreciable assets, especially when depreciation costs are allocated to the major functions. Square footage and asset values are completely independent variables. The square footage method is better suited to micro-cost allocations of depreciation costs.

Service and Usage as Allocation Bases

Most costs appear in the cost accounting MIS as transaction records. Processing and maintaining these records—student invoices, travel charges, course registrations, purchase orders, student applications and matriculations, records of meals consumed—engender their own operating costs. Especially in a paper-intensive operation, it might be assumed that counting purchase orders processed or measuring the value of the purchase orders might point to how the engendered costs could be allocated. As a result, there is an extensive practice whereby the costs of certain departments—the purchasing department, for example—are now allocated on the basis of the volume of the transactions in question, their value, or a combination of the two.

But, is counting invoices, purchase orders, and other transaction documents really a constructive use of employee time, especially when the transactions in question are increasingly paperless? For example, an institution might decide to allocate the full cost of the purchasing department to other activities in direct proportion to the volume or value of the transactions it executed on their behalf. Perhaps it would make more sense to develop a transaction-value-based "handling" charge of the type seen commonly on invoices today. This handling charge would be added in cost-plus fashion to the total cost of each purchase order when debited to the purchaser's account. Actually, many institutions prefer the direct-service-charge method, although the charge itself may be derived from standard cost information that relies on estimates of the historical volume of transactions.

What used to be seen as usage-based costing is increasingly known as process and activity costing, and is discussed in chapter 7. However, other usage measures exist which are very logical and useful bases for allocating costs to users. They include the following:

- Kilowatt hours
- Miles per hour
- British thermal units
- Library book and other circulation units
- Computer center usage measures
- Square feet of paving, of floor covering, or of painting
- Job orders for printing, copying, and mail handling

In addition to serving as allocation bases for pooled support costs, these measures are even better suited for direct costing through internal or transfer pricing.

Other usage indicators focus on employee and student use of facilities or student-based output measures. They include FTE faculty, FTE personnel, personnel hours (or more simply, number of personnel), student contact hours, student credit hours, degree completion units, and FTE students. Such measures translate costs well for internal pricing and direct costing, but many are output rather than input measures and may not always be appropriate bases for cost allocation purposes. In contrast, they are excellent measures for determining unit costs.

When support costs are first pooled and later allocated to the appropriate cost centers on the basis of usage, the choice of the most appropriate batch allocation method depends on the required degree of cost precision. All usage-based batch or percentage cost allocation methods sacrifice precision for expediency by averaging support costs across cost centers. As the institutional cost accounting MIS develops, internal pricing and direct charging of support costs may be preferable. Counting the number of transactions and then allocating the costs they represent in proportion to these numbers does seem somewhat primitive. Several universities and colleges are experimenting today with more complex formulas for determining certain types of usage. Of particular interest are newer models used to measure the usage of computer centers and libraries.

Allocating Costs Among Support Activities and Other Cost Allocation Concepts

Step-Down and Cross-Allocation of Pooled Costs

Most cost accounting textbooks recommend that institutions use the so-called step-down method when allocating costs, and Circular A-21 requires it. This method defines how pooled costs must be allocated to primary and support programs. According to the recommended sequence, pooled direct and indirect costs are first allocated to the affected support and primary programs. Subsequently, all fully costed support program costs are allocated to primary cost centers.

In its most advanced stage, this method is also referred to as the cross-allocation method and is preferred in for-profit enterprises and increasingly in higher education. It should come into its own under SFAS No.117. It acknowledges costs not only between primary and service departments, but also among service departments. The underlying cost accounting MIS incorporates the appropriate crossover mechanisms which shuttle interservice costs from supplying to consuming service departments. At the end of the interservice allocation process, support cost centers are left with their own direct costs. The stage is then set to allocate the remaining support costs to the primary cost centers.

Notes

1. During the preparation of this manual, several representatives from the public sector raised this issue with the author. One concern was the degree to which less pooling of costs might make certain direct costs more visible to academic user departments. Another concern was that, absent definitive full-cost principles applied to budgeting, institutions may reach the point where too much budget authority is being relinquished by the central administration so that others within the institution have the power to decide how much support to budget.
2. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21; reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994). James A. Hyatt, *A Cost Accounting Handbook for Colleges and Universities* (Washington, D.C.: NACUBO, 1983).
3. *Statement of Financial Accounting Standards No. 117: Financial Statements of Not-for-Profit Organizations*, Financial Accounting Series No. 127-B (Norwalk, Conn.: Financial Accounting Standards Board of the Financial Accounting Foundation, June 1993).

4. Many colleges and universities assign specific revenue streams to specific educational programs and departments. A potential drawback is that some managers may assume that the assigned revenues are actually theirs rather than the institution's. If revenues are allocated directly to departments or activities—say, tuition revenues in some proportion to enrollment—the respective departmental or activities budgets should reflect full, not merely direct, costs.

— Appendix C —

Indirect-Cost Allocation Under Circular A-21

This summary of Circular A-21 provisions is based on the July 26, 1993, revision, which went into effect on January 1, 1994.[1] At the time this manual was ready to go to press, the Office of Management and Budget (OMB) had published proposals for yet another revision of Circular A-21 with changes which could on balance have a significant impact in further limiting indirect-cost recovery.[2]

This appendix answers the following questions:

1. What is the purpose of Circular A-21?
2. What is the difference between total, allocable, and allowable costs?
3. How does Circular A-21 define direct and indirect costs?
4. How is an institution's indirect-cost rate determined (a) under the normal method and (b) under the simplified method?
5. Which principal allocation bases are stipulated?
6. What other rules must institutions be aware of?
7. How is Circular A-21 influencing institutional accounting practices?

The following discussion is not intended to be comprehensive and is in part based on materials used by NACUBO's Professional Development Department in its periodic workshops on indirect-cost recovery accounting.

Circular A-21 Is a Special Case

Figure C.1 illustrates where Circular A-21 fits into an institution's overall program and account structure. Figure C.2 focuses on the difference between an institution's true costs and those allowed under the circular. Thus, it is easy to see (1) that the circular relates to a fraction of an institution's total activities and (2) that for the activities involved, it addresses less than their full costs.

Figure C.1: Major Institutional Costing Tasks

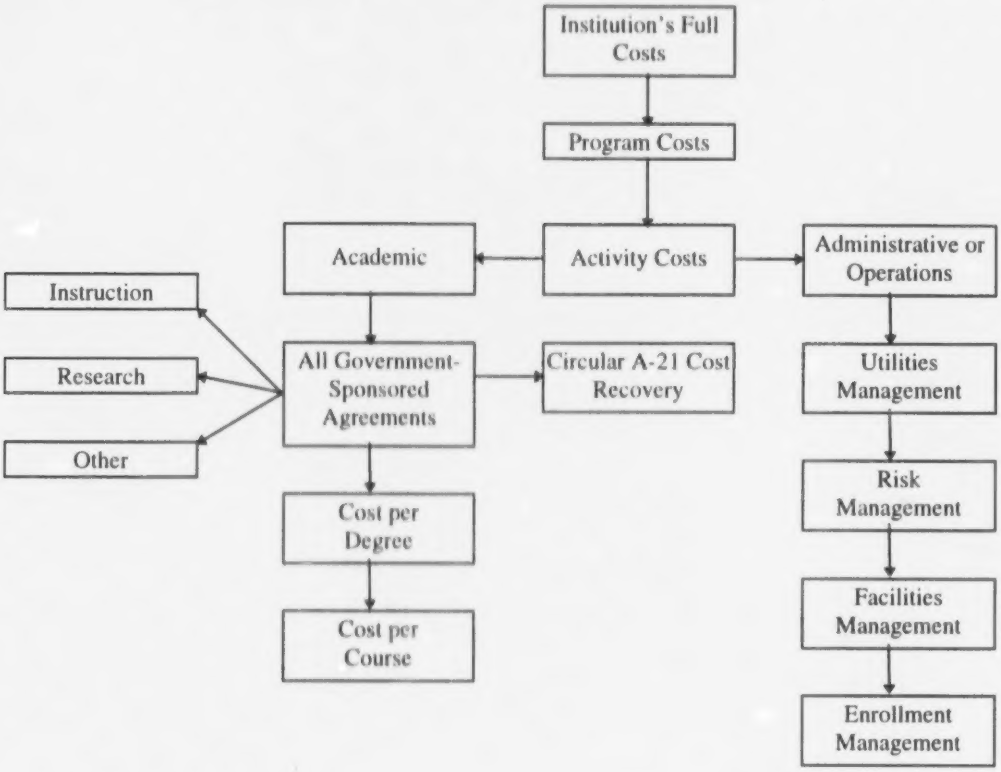
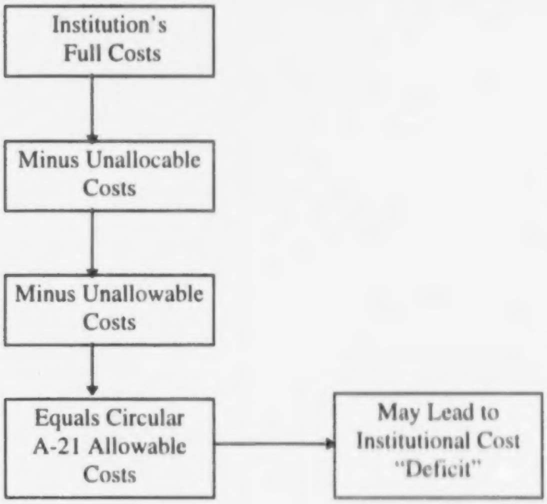


Figure C.2: Institutional Versus Circular A-21 Costs


Institution's Full Costs
Minus Unallocable Costs
Minus Unallowable Costs
Equals Circular A-21 Allowable Costs
May Lead to Institutional Cost "Deficit"

Both exhibits highlight the fact that the circular embodies the inherent contest between the federal government and the institution: While attempting to reach a fair result, the government's interest lies in minimizing its costs, whereas the institution's interest rests in maximizing indirect-cost recovery. When adhering to the circular's rules, the institution must not subordinate its interests to those of the government, especially when it comes to implementing institutional cost accounting procedures.

Figure C.2 highlights the potential for a cost-recovery deficit, a potential which is greater today under more restrictive reimbursement rules, such as the 26 percent limit on administrative-cost recovery. David H. Douglas estimates that at the University of Rochester this deficit, amounting to a subsidy to the government, may be as high as 15 percent, and he thinks that it may be much larger at institutions with a large sponsored-activities exposure.

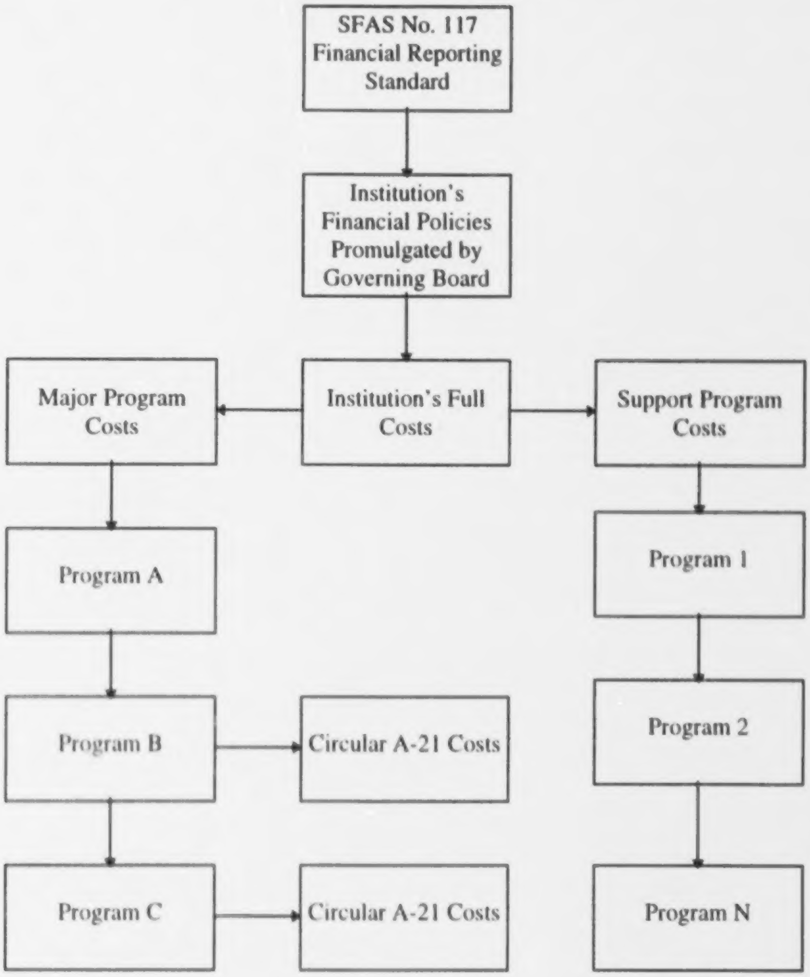
How Important Are Circular A-21 Covered Activities?

Unless institutions are careful, the circular's rules can adversely influence the institution's financial policies and outcomes. For instance, the cost deficit highlighted in figure C.2 is reminiscent of below-cost reimbursements in the health care industry. Since there is no free lunch, if the government does not pay the entire tab, tip included, someone else must by necessity pay the difference. This difference is called "cost sharing" and is fundamental to most government grants. Sponsored projects at colleges and universities are no exception: The government expects the institution to fund a portion of each project.

How important is sponsored-activity cost recovery in higher education? Figure C.3 shows its place within the hierarchy of institutional costing tasks. However, this exhibit tells us nothing about the dollar scope of the underlying institutional activity. John Minter Associates estimated the federal government's sponsored grants and contracts contribution for 1993 for a national sample of public and private research and doctoral universities.[3] The median revenue share was 13.8 percent for public institutions and 14 percent for independent institutions; the corresponding expenditure share was 12.2 percent and 12.1 percent, respectively. The upper quartile median values for revenues were 24.6 percent for public institutions and 29.3 percent for independent universities; for expenditures, they were 21.1 percent and 24.3 percent, respectively. This is without a doubt significant. For institutions in this sponsored-activities bracket, Circular A-21 becomes a major preoccupation. For institutions with negligible indirect-cost-recovery exposure, the circular's effect may be that of a minor nuisance, but one that could still be expensive if not managed properly.

Institutions with large exposure are compelled to create at least a supplemental Circular A-21–related system of cost accounting. In this way, the circular influences how cost accounting in general is carried out at many universities and colleges, and helps explain some of the inadequacies of these systems.

Figure C.3: The Place of Sponsored Grants and Contracts in the Structure of Institutional Activities



On the Purpose of Circular A-21

The circular defines its purpose as follows:

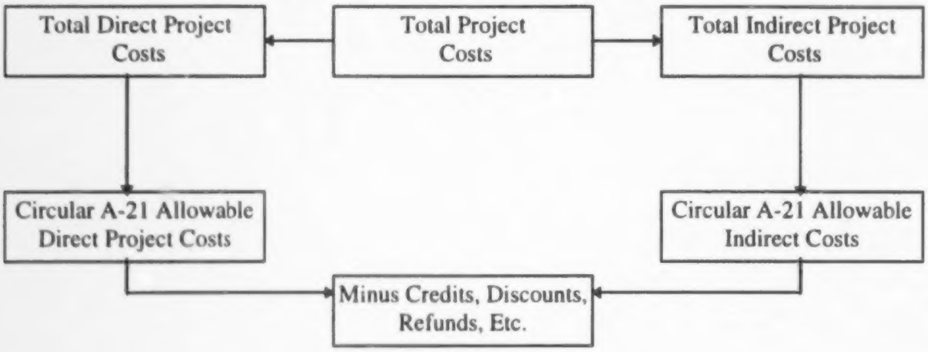
> [To establish] principles for determining the costs applicable to research and development, training, and other sponsored work performed by colleges and universities under grants, contracts, and other agreements with the federal government. These agreements are referred to as sponsored agreements.[4]

The practical and ultimate objective of the circular is to help institutions determine their indirect-cost-recovery rate. A secondary objective is to define the accounting constraints for determining this rate. Computing an indirect-cost rate that is acceptable to the government is a tedious and time-consuming undertaking at universities that are required to use the modified total direct-cost method, described below.

Total, Allocable, and Allowable Costs

The total cost of a sponsored agreement or project is the sum of all allowable direct costs, plus that portion among allocable costs represented by the allowable indirect costs, minus any credits explicitly designed for or resulting in a reduction of these combined costs. Figure C.4 summarizes the relationship among these elements.

Figure C.4: Circular A-21 Allowable Costs


Total Direct Project Costs
Total Project Costs
Total Indirect Project Costs
Circular A-21 Allowable Direct Project Costs
Circular A-21 Allowable Indirect Costs
Minus Credits, Discounts, Refunds, Etc.

Direct costs are those caused by the sponsored agreement. Institutions have many different types of pooled costs that are allocable to major and support cost centers as either direct or indirect costs. However, only allowable allocable indirect costs can be charged to sponsored agreements. Therefore, from the institution's point of view, the total cost of a sponsored agreement is always larger than the total cost allowed under Circular A-21 constraints.

Allowable Costs

In order to be allowed, direct and indirect costs must be—

- reasonable,
- allocable to projects under the circular's standards,
- consistent with accepted accounting principles appropriate to the circumstances, and
- consistent with the circular's or a sponsored agreement's limitations.

Allocable Costs

Costs are allocable to sponsored activities if they—

- are incurred solely to fulfill the terms of the sponsored agreement,
- benefit the project and the institution and can be prorated in a reasonable or logical manner, or

- are necessary for the operation of the institution and can be apportioned to the project in a reasonable manner—the affinity requirement.

Applicable Credits

Applicable credits include—

- purchase discounts and rebates, including educational discounts,
- allowances in purchase contracts or in professional service agreements,
- insurance and other indemnifications and recoveries for losses, and
- adjustments in the project agreement for erroneous charges, unallowed costs, overpayments, and unused funds.

Direct and Indirect Costs

Once costs have been organized as either direct or indirect, they must be treated consistently as such under identical circumstances. Furthermore, once a sponsored agreement cost has been treated as a direct cost, it must be so treated for all institutional activities. Some institutions use this requirement as a reason why they cannot or will not change the existing cost accounting practices.

Direct Costs

Typical direct-cost pools include the so-called primary programs and encompass the institution's academic activities (i.e., instruction, research, public service, and auxiliary activities, including hospitals and other independent operations and professional academic schools and divisions). The sponsored component may be subdivided into sponsored instruction, organized sponsored research, other sponsored activities, and departmental or university research.

Costs that can be linked logically or assigned with relative ease to a sponsored project are direct costs. Examples of typical direct costs are salaries, wages, and staff benefits for personnel involved in sponsored projects; costs for materials and supplies used directly in such projects; the direct costs of telecommunications, travel, and even extraordinary utility consumption; and equipment used principally for the sponsored project.

The circular insists that if the institution treats some of these types of expenses as indirect costs, it must use them as indirect costs also for sponsored projects. Conversely, if the institution consistently treats these expenses as direct costs and adheres to accepted and consistent cost accounting practice, the expenses can be classified as direct costs for sponsored projects.

Indirect Costs

Indirect costs are those common institutional or joint costs that cannot be identified readily or easily with a sponsored project. Indirect-cost pools normally include academic support, facilities operations and maintenance, general administrative support, departmental and sponsored-activities administration, student services, and facilities-use allowances or depreciation. These major groupings may have their respective subpools, including libraries, utilities, and transportation.

Circular A-21 establishes criteria for cost pooling. Some of the factors in separate cost pooling are the following:

- Cost elements that pertain to a separate institutional activity or to less than the entire institution
- Cost elements that are susceptible to usage measurement (e.g., workload and enrollment)
- Common costs (e.g., general and departmental administration) that are charged directly to a sponsored project and must be eliminated from indirect-cost pools
- Institutional activities that provide their own administrative, logistical, and maintenance support
- An institution's decision to pool certain costs such as staff benefits

The purpose of the indirect-cost allocation process under Circular A-21 is to distribute the allowable shares of these pooled costs in a reasonable manner to the sponsored projects.

Indirect-Cost Distribution Methods

The circular affirms the affinity principle. Below are the reasons for allocating indirect or pooled costs to a sponsored project:

- The project or cost center derives the greatest benefits from this method.
- There is a traceable cause-and-effect relationship.
- It is logical or reasonable.
- The allocation results from a special cost study.

Requirements for Cost-Analysis Studies

The latest proposed revision would eliminate cost-analysis studies and replace them with other, government-proposed (or -imposed) benchmarks. If the proposed change does not materialize, which is unlikely, the requirements are as follows:

- Adequate documentation must exist.
- Costs must be allocated on the basis of benefits derived by sponsored projects.
- Cost measurements and allocation must be statistically sound.
- Studies must be institution-specific.
- Periodical reviews must occur at least every two years.

If cost studies are not performed, section F of the circular stipulates appropriate indirect-cost allocation bases. Bases other than section F are permitted if—

- a different base is demonstrably more equitable,
- a more readily available base does not increase the sponsored project's cost, and
- the institution elects and qualifies for the simplified indirect-costing method.

All cost groupings that can be identified directly with a sponsored project or with a benefiting cost objective must be allocated directly.

Order of Distribution

The following indirect-cost categories must be allocated in the following order:

1. Depreciation and use allowance
2. Operation and maintenance
3. General administration and general expense
4. Departmental administration
5. Sponsored-projects administration
6. Libraries
7. Student administration and services

Items 1 through 3 should be allocated in that order to the remaining indirect categories 4 through 7 and to all major institutional functions and specialized service facilities. Categories other than those listed may be allocated in the order deemed most appropriate by the institution.

If an institution uses the cross-allocation method, the preceding order does not apply. Otherwise, once a given category of indirect costs has been allocated, that category is considered to be closed. This means that costs cannot subsequently be allocated to it.

Indirect Facilities Costs

Facilities costs include the following:

- Depreciation or use allowances
- Interest on debt associated with specific facilities
- Equipment and capital improvements
- Operations and maintenance expenses
- Library expenses

This combination of facilities costs became effective on January 1, 1994.

Depreciation and Use Allowances: Common Principles

Depreciation and use allowances are similar, yet quite different, indirect costs under Circular A-21. However, there are several common allocation principles governing depreciation and use allowances:

- If they apply to a single function or activity, they should be allocated to that function or activity only (thus being seen as a direct cost).
- If they apply to more than one function or activity, they must be allocated on the basis of usable square feet, excluding common areas such as hallways, stairwells, and rest rooms.
- If they apply to jointly used functions, they must be allocated to the benefiting functions either—

  - on the basis of employee full-time equivalents (FTEs) or on the respective percentage shares of the salaries and wages of the functions that benefit from the use of the particular spaces, or
  - on the basis of institutionwide employee FTEs or salaries and wages of the benefiting major functions of the institution as defined by the circular.
- If they apply to improvements of land (but not buildings)—parking lots, fences, sidewalks, etc.—they must be allocated on the basis of user categories, such as FTE students or FTE employees. More specifically, the cost allocated on the basis of student FTEs must be charged to instruction; that allocated on the basis of employee FTEs must be charged to major functions of the institution as a percentage of each function's total salaries and wages.

Interest

The circular treats interest as a direct cost to the facility, equipment, and improvements that caused it. Beyond that, it stipulates that interest will be allocated in the same manner as depreciation and use allowances.

Operations and Maintenance Expenses

This category normally includes the following:

- Janitorial and utility services
- Utilities proper
- Repairs and normal alterations of buildings
- Furniture and equipment
- Maintenance and operation of all kinds of facilities
- Earthquake and disaster preparedness
- Environmental safety
- Hazardous waste disposal
- All types of insurance relating to property
- Space and capital leasing
- Central receiving
- Facilities planning and management
- Allocable share of staff benefits, if not charged directly already
- Allocable share of depreciation or use allowances
- Allocable share of interest

These types of costs should be allocated either on the basis of the rules summarized in section E.2.d or F.2.b of the circular.

Libraries

Library costs include expenses for—

- operations (i.e., salaries, staff benefits, supplies),
- any direct facilities maintenance and repairs,

- books and specialized library materials,
- an appropriate share of general administrative costs, and
- the allocable share of depreciation or use-allowance expense.

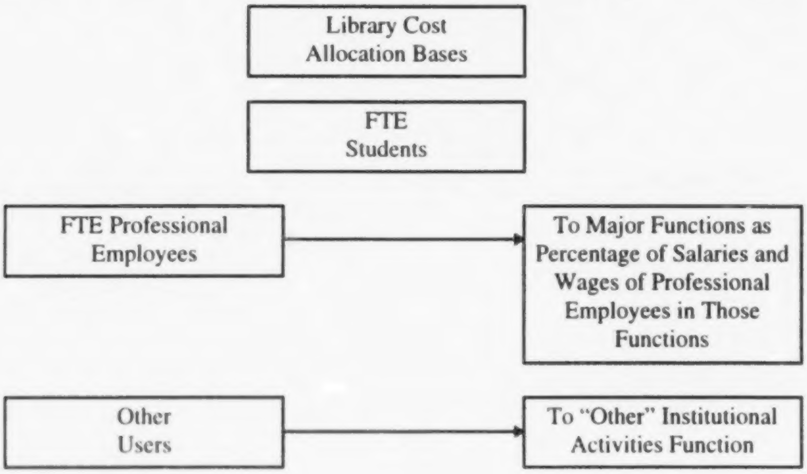
Deducted from these costs must be any revenues collected by the libraries. The acquisition of rare books with no value to sponsored projects is expressly excluded.

In the absence of the circular's section E.2.d allocation alternatives, the rules for the allocation of library costs are summarized in figure C.5. According to the circular, and illustrated in the exhibit, library costs are to be allocated on the basis of three user categories:

- FTE students
- FTE professionals (faculty and other professional users)
- Other users

The FTE student number does not depend on whether or not students earn credits toward a degree.

Figure C.5: Allocation Rules for Library Costs Under Circular A-21, Section E.8


Library Cost Allocation Bases
FTE Students
FTE Professional Employees
To Major Functions as Percentage of Salaries and Wages of Professional Employees in Those Functions
Other Users
To "Other" Institutional Activities Function

Costs for Administration

Since January 1, 1995, these include—

- General administration and general expenses
- Departmental administration
- Sponsored projects administration
- Student administration and services
- All other categories of expenses not listed specifically

General Administration and General Expenses

Included here are costs that do not pertain solely to one major institutional function. They include all expenses for administrative tasks that serve an entire institution or an entire university system, including the appropriate and allocable shares of staff benefits, operation and maintenance expense, and depreciation or use allowances.

- Chancellor's or president's office
- Institutionwide financial management
- Business office
- Budget and planning
- Personnel services
- Legal services
- Risk, safety, and compliance management
- Data processing and administrative computer services
- Central management information services
- All other institutionwide management services

In the absence of the allocation alternatives of section E.2.d of the circular, these general costs must first be allocated to the major institutional functions to which they render services or provide benefits on the basis of the so-called modified total direct-cost method. Costs of this general nature that are rendered to other institutions or agencies must be excluded.

Departmental Administrative Costs

These strictly limited costs include the following:

- Academic deans' offices
- Academic division deans' or chairs' offices
- Academic department offices
    - Bid and proposal preparation
- Organized research institutes
- Study centers
- Research centers

The following limitations apply: For academic deans' offices, salaries, staff benefits, and operating costs are limited to the portions attributable to administrative services. For departments, salaries and staff benefits for department heads, faculty, and other professionals conducting instruction and research shall be allowed at a rate of 3.6 percent of modified total direct cost. This allowance will be added to the computation of the institution's indirect-cost rate. Professional business and administrative officers are not included in this cost category.

Departmental salaries, wages, and staff benefits for clerical and secretarial personnel, administrative officers, and assistants; travel; supplies, materials, and stock room expenses; and other costs are allowable, but must be treated consistently in like circumstances.

On January 1, 1994, a new section (F.6.b) was added that stipulates how certain costs should be treated. It defines how the departmental administration cost pool should be created. The section addresses not so much the costing of sponsored projects as how the institution should set up its cost accounting system. But if the stated requirements are to be taken literally, the following will apply:

- Direct charges are appropriate for salaries and wages for technical staff, laboratory and other supplies, telephone toll charges, animals, animal care, computers, travel, specialized shop costs, and salaries, wages, and benefits—if they are not pooled.
- Direct charges are also appropriate for salaries, wages, and benefits of administrative personnel, provided that the costs can be clearly identified with a specific activity or project; otherwise, they should be treated as indirect costs.
- Indirect charges are appropriate for office supplies, postage, local telephone costs, memberships, etc.

These recommendations or requirements obviously depend on how precisely an institution costs and budgets its various activities.

In the absence of the section E.2.d alternatives, the expenses shall be allocated as follows:

- Administrative expenses for the departmental dean's office shall be allocated within a college or school on the basis of the modified total direct cost.
- Administrative expenses for a department and any allocated share of the administrative expense of the academic dean's office shall be allocated to appropriate functions of the department on the modified total-direct-cost basis.

Appropriate allowances are permitted for operation and maintenance expenses, and depreciation or use allowances.

Sponsored-Projects Administration

The sponsored-projects administration is a separate organization specifically created to administer sponsored activities. This entity may administer nonfederal programs and may include expenses for the following:

- Grants and contracts administration
- Purchasing and inventory management
- Personnel administration
- Publishing and printing
- Special security arrangements
- Staff benefits
- Operations and maintenance
- Depreciation or use allowance

Absent section E.2.d alternatives, these costs will be allocated on the modified total-direct-cost basis, after adjustments for any duplicate charges to sponsored projects, for costs charged to others, and for revenues received.

Student Administration and Services

This category of costs includes expenses for the following:

- Dean or office of admissions
- Dean or office of student affairs

- Student counseling and placement
- Student advisement
- Infirmary and student health services
- Catalogs
- Commencement, convocations, and other normal student-related public events
- Salaries, wages, and benefits for academic personnel whose administrative responsibilities to the institution benefit sponsored projects
- Appropriate shares of operations and maintenance, and depreciation or use allowance expenses

In the absence of section E.2.d alternatives, these costs must be allocated to instruction and subsequently to sponsored projects within instruction.

Offsets

If the federal government reimburses an institution outside the terms of a sponsored agreement for any facilities or administration costs, such reimbursement must be treated as credit to the specific individual indirect-cost category before any costs within that category can be allocated to the benefiting function.

The Modified Total Direct-Cost Base

The circular's section G.2. defines the composition of the modified total direct-cost base as follows:

- Salaries and wages
- Staff benefits (called fringe benefits by the circular)
- Materials and supplies
- Services
- Travel
- Subgrants and subcontracts up to the first $25,000

Excluded are the following:

- Equipment
- Capital expenditures
- Charges for patient care
- Tuition remission
- Rental costs
- Scholarships and fellowships
- Subgrants and subcontracts in excess of $25,000

Other cost elements cannot be excluded unless an inequity in the distribution of indirect costs would occur if they were included. The modified total direct cost corresponds, with the exception of the excluded rental costs, to the consumables cost aggregate defined in chapter 3. However, all unallowable consumables must first be eliminated.

The Indirect-Cost Rate

The following formula calculates the indirect-cost rate:

> Total value of a given indirect-cost pool ÷ modified total direct cost = indirect-cost rate

Institutions have either one or multiple indirect-cost rates. According to the circular, each major function has its own aggregate indirect-cost pool. The amount in each of these pools that must be divided by the corresponding modified total direct cost to arrive at a single indirect-cost rate for each function.

Sometimes single indirect-cost rates may not be appropriate. When significantly different environmental and other conditions prevail, more than one indirect-cost rate may be indicated. Environmental factors include facilities, the nature and extent of administrative support, the scientific disciplines involved, and organizational arrangements.

The circular permits other cost-recovery arrangements:

> *A Negotiated Indirect-Cost Lump Sum.* This may be appropriate for self-contained sponsored projects or off-campus or primarily subcontracted activities where it may be difficult to determine indirect costs with sufficient precision.
>
> *A Predetermined Fixed Indirect-Cost Rate.* This approach is permitted by Public Law 87-638 (76 Stat. 437). The purpose of the provision was to simplify grant administration, to facilitate project budget preparation, and to speed up sponsored project contract close-out.
>
> *Negotiated Fixed Indirect-Cost Rate.* A fixed rate may be negotiated in advance for a given fiscal year or any other period. Any over- or under-recovery may be carried forward as an adjustment to the indirect cost of the next rate negotiation.
>
> *Provisional and Final Indirect-Cost Rates.* Under certain circumstances, a provisional indirect-cost rate can be established. This rate can be adjusted by the cognizant agency to prevent under- or overpayment. If a provisional rate is not replaced by a fixed or predetermined rate, it can be replaced by a final rate.

Limitation on Reimbursement of Administrative Costs

The reimbursement of administrative costs is limited to 26 percent of modified total direct costs for the total value of the following:

- General administration and general expense
- Departmental administration
- Sponsored-projects administration
- Student administration and services and their allocable share of depreciation or use allowance, interest, operation and maintenance, and staff benefit costs
- All other types of expenses not listed specifically under one of the subcategories of facilities in the circular's section F

Alternative Method for Administrative Costs

An institution may claim a fixed allowance for the administration portion of indirect costs. This allowance can be either 24 percent of modified total direct costs or 95 percent of the most recently negotiated fixed or predetermined rate, whichever is less. No cost proposal need be prepared for this portion of indirect costs, nor is documentation of these costs required. No further charges for expenses incurred by the subcategories under "Administration" are permitted if this method is used.

The Simplified Method for Small Institutions

The simplified method may be used when the total direct cost of work covered by Circular A-21 does not exceed $10 million in a fiscal year. The simplified method involves the following steps:

A. Determine the total amount of salaries and wages paid to all employees.

B. Create an indirect-cost pool composed of the following (not counting capital and unallowable items):

- General administration and general expenses
- Operation and maintenance expenses
- Libraries
- Departmental administration expenses, computed at 20 percent of the salaries and expenses of deans and/or department heads

Note that student administration and services, student activities, and student aid and scholarship expenses are excluded.

C. Create a salary-and-wage distribution base by deducting salaries and wages under B from A.

D. Calculate the indirect-cost rate (equal to C ÷ B).

E. Multiply the indirect-cost rate percentage of D by the total value of the direct salaries and wages of each sponsored project. This figure represents the indirect costs that can be allocated to each sponsored project.

Examples of Unallowable Expenses

Section J of the circular lists 50 categories of costs. For each it identifies the unallowable costs. The accounting system must find a way to eliminate these costs from the modified total-direct-cost base as well as from all direct costs. In general, costs are unallowable if they are not directly related to the nature and scope of the sponsored project. They are allowable only within the specifications published in section J of the circular. A general exception is the general administration and support costs that can be allocated to sponsored projects. The following list is not complete, but it gives an idea of the kinds of costs that must be eliminated from the modified total-direct-cost base and from any direct and pooled indirect costs.

- Expenses for convocations or other special events, including those for materials, salaries, wages, and facilities
- Expenses for promoting the institution
- Alcoholic beverage expenses
- Expenses in support of alumni activities
- Losses from uncollectibles and any related legal and other collection expenses
- Civil defense costs for premises and capital expenditures for civil defense purposes
- Commencement and convocation expenses other than those permitted in F.7
- Increases in pension costs not funded 30 days after each calendar quarter
- Late payment charges for pension plan termination insurance premiums, excise taxes on funding deficiencies, and prohibited pension plan transactions by fiduciaries
- Expenses related to personal use of institution-owned vehicles
- Any contingency provisions for future events
- Expenses concerning lobbying activities as listed in J.24.a–g
- Any excess of cost over income from other sponsored projects
- Membership expenses for civic or community organizations and country, social, or dining clubs
- Pre-sponsored-agreement costs unless permitted by a cognizant agency
- Professional services expenses that have no material relationship to the sponsored project
- Certain losses from sale or disposition of facilities and equipment
- "Help wanted" advertising in color or of excessive size
- Expenses pertaining to special recruitment inducements
- Certain rental costs (J.38)
- Marketing expenses for institutional products and services
- Severance pay in excess of institution's normal severance pay policy
- Expenses involving certain legal proceedings
- Donations, contributions, and entertainment costs
- Trustee travel and subsistence costs

This long and incomplete list may in part be subject to interpretation. The potential dollar amount of expenses that must be deducted from the institution's total direct and indirect costs can be quite substantial.

Depreciation and Use Allowances

Rules governing the accounting for depreciation costs seems to be more generous than those covering use-allowance accounting.

Depreciation Costs

Depreciation costs are based on the acquisition cost of assets and their useful lives. Excluded from the asset base are—

- cost of land (which would be changed in the newly proposed revision),
- cost of equipment and plant donated by the government, and
- any portion of cost of plant and equipment where the law prohibits recovery.

Useful-life estimates must take into account—

- type of construction,
- nature of equipment,
- technological developments in the area in question, and
- the institution's renewal and replacement policies.

The particular depreciation method used must reflect the pattern of consumption of each asset during its useful life. Normally, the straight-line method of depreciation is required. For assets whose depreciation is highest in the early years of use, declining-balance or similar accelerated depreciation may be allowed by the cognizant agency.

Under the depreciation method, a building shell may be treated separately from such components as plumbing, air-conditioning, heating, or other installations with shorter useful lives. These may then be depreciated separately. Assets which have outlived their useful lives cannot be depreciated.

The Use-Allowance Method

The following rules must be observed:

- The use allowance for buildings and improvements is 2 percent of acquisition costs per year.
- The allowance for equipment is 6.67 percent of acquisition cost per year.
- The entire building must be treated as a single depreciable asset.
- The 2 percent limit need not be applied to movable installations that are not permanently affixed to the building (furnishings, decorations, or specialized items such as dentist chairs, counters, dishwashers, and carpeting). The use charge for such installations can be based on the 6.67 percent rule.
- For fully depreciated assets that come into sponsored-project use, a reasonable use allowance may be negotiated.

Combinations of depreciation and use allowance for the same asset class is not permitted, unless specifically allowed.

Charges for depreciation and use allowances must be properly documented on the basis of physical inventories taken at least every two years. Statistical sampling techniques may be used in estimating these inventories. For the depreciation method, records of depreciation for prior years must be maintained.

The largest college and university recipients of sponsored projects must furthermore abide by the following:

- For federal full-negotiated-rate sponsored projects, indirect-cost payments made for depreciation or use allowances must be spent immediately or reserved for expenditure within five years on the acquisition or improvement of research facilities. These amounts can be spent to reduce debt on old assets, acquire new assets, or improve existing ones.
- Recipient institutions of such reimbursement for depreciation or use allowance must report to the cognizant agency that fact and how they implement the above requirement.

Conclusion

Circular A-21 contains other provisions that center on the enforcement of its rules and includes a listing of institutions that fall under section J.9 F. The preceding summary of the circular focused on the principal indirect-costing definitions and rules. An early reading of the latest forthcoming revision indicates that several significant changes in these rules are being considered seriously. Most of these will tend to reduce, rather than increase, indirect-cost recovery. Some also improve and sharpen institutional cost accounting practices, particularly for so-called cost accounting standards (CAS) institutions, those subject to Cost Accounting Standards Board rules.

The current Circular A-21 recognizes at least two types of institutions:

A. Those with contracts in excess of $10 million whose cost recovery represents a substantial percentage of total revenues, and who must implement the modified total direct-cost base for computing the indirect-cost rate

B. Those who can avail themselves of the simplified method for computing their indirect-cost rate

Thus, it is not surprising that the incentives to shape one's internal cost accounting system differ significantly for these two groups. In group A, there may be legitimate reasons and a natural incentive to shape the basic cost accounting system in terms of the Circular A-21 requirements. Actually, under proposed revisions, these institutions are CAS institutions.

The circular is a good illustration of the legal fiction of costing: Many of the imposed cost allocation rules—while developed with the help of institutions—are arbitrary and, once codified, difficult to modernize. Even the many revisions have not contributed much to making costing more precise or easier. The circular's allocation constraints and its pooling requirements or assumptions may help freeze the system in place. Otherwise, it might evolve more rationally as institutions see the need for new approaches.

Circular A-21 describes a system of cost allocation designed to control and, increasingly, to minimize the government's support of colleges and universities through indirect-cost recovery. The circular has helped develop, with the clear consent of higher education, a system of cost-recovery accounting that puts almost extreme emphasis on alleged indirect costs.

This is interesting, since there is nothing in Circular A-21 that prevents institutions from maximizing direct costing. The only requirement is that they be consistent. The more allowable direct costs they can claim, the less indirect-cost reimbursement they may need. But there is the rub: How will institutions allocate their direct and indirect-cost recoveries? Who has the right to spend indirect-cost-recovery revenues? Although these are internal financial policy matters which governing boards and administrations could and must resolve, current budget allocation practices should not prevent institutions from adopting rational cost accounting procedures.

Finally, it may be appropriate to suggest that the circular does not always make a clear distinction between expenses and costs, treating them as synonyms when they are not. A classic example of this is afforded by how library expenses are treated. First, to list libraries as a facilities-type cost is amusing, to say the least. Second, to identify fully expensed library-asset acquisitions as a cost, rather than only treating the depreciable portion as a cost, is inconsistent with almost everything else in the circular. Of course, the combined effect tends to produce larger cost recoveries than would otherwise be possible.

Notes

1. Office of Management and Budget, *Cost Principles for Educational Institutions*, OMB Circular A-21; reprinted in James L. Feldesman, Jacqueline C. Leifer, and Michael B. Glomb, eds., *Federal Auditing Information Service for Higher Education* (Washington, D.C.: NACUBO, 1994).
2. Office of Management and Budget, "Cost Principles for Educational Institutions," *Federal Register* 60:7104 (Feb. 6, 1995).
3. Data provided author by John Minter Associates, Boulder, Colo., Oct.–Dec., 1995.
4. Feldesman, Leifer, and Glomb, *Federal Auditing Information Service*, p. 1005:2.

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